CFP-15+/15E+ Cylinder Filling Plant

Installation, Operation and Maintenance Manual

Oxygen Generating Systems Intl. (*OGSI*)
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Table of Contents

Topic	Page Number
Using this Manual	**1**
Initial Inspection	**2**
Warranty Information and Liabilities	**3**
Safety Guidelines	**5-7**
➢ Unpacking	**5**
➢ Handling	**6**
➢ Operating	**7**
Product Information	**8-24**
➢ Features and Applications	**8**
➢ PSA Technology	**10**
➢ Components	**11**
➢ Process Flow Description	**25**
➢ Specifications	**26**
Safety Precautions	**28**
Pre – Installation	**29**
Required Operating Conditions	**30**
Set-up and Installation	**31**
Operating Instructions	**32**
Troubleshooting Guide	**33**
Touch Screen Overview	**35**
Manifold Design and Installation	**49**
Preventive Maintenance	**52**
Technical Service Assistance	**53**
Appendix	**I-VII**
➢ Spare Parts List	**I**
➢ Oxygen Cleaning Procedure	**II**
➢ Oxygen Sensor Calibration Procedure	**VI**
➢ Air Changes by Room Size	**VII**
➢ Units of Measurement	**VIII**
➢ Maintenance Log	**IX**

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Password to Access Touch Screen

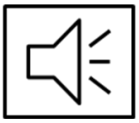
647401

Please take appropriate measures to keep this password secure and prevent unauthorized access.

Using the Manual

This manual is intended as a guide for operators of ***OGSI*** Oxygen Generators and Oxygen Generating Systems. It includes information on our warranty policy, features, functions, applications, proper set-up and installation, operation and maintenance of our products.

The following symbols are used throughout the manual:

	Information (Do not use product before reading the manual)		**Electrical Hazard**
	**Sound**		**Fire Hazard**
	No Smoking		**Warning**
	No Open Flames		**Power ON/OFF**
	Flow Meter		**Timer**
	No Oil		**Not Connected to Outlet**

Initial Inspection

The crate should be opened and inspected immediately upon delivery. Unpack the unit at once and perform a visual inspection to determine if it is dented, bent or scratched. Also check to make sure the power cord is attached and that the control panel has not been damaged in any way during shipment.

If for any reason the unit should need to be returned in the future, this crate is the best way to ship it back to the manufacturer. Claims of damage due to freight handling can only be filed by you, the consignee, as ***OGSI*** shipping terms are Free On Board (FOB), North Tonawanda, NY USA. This means that once the equipment leaves our dock you are the owner of it. ***OGSI*** has no legal claim to make against any shipping company for damage.

At ***OGSI***, we are committed to using shipping companies with good reputations for taking care in the handling of freight and providing service in the event of damage.

Warranty

Oxygen Generating Systems Intl., being a division of Audubon Machinery Corporation (hereinafter ***OGSI***), provides a warranty on its products (the "Products") against defects in material and workmanship, under normal use and operation, to the extent set forth in this Warranty.

THIS WARRANTY IS THE SOLE AND EXCLUSIVE WARRANTY OF ***OGSI*** WITH RESPECT TO THE PRODUCTS AND IS IN LIEU OF ALL OTHER WARRANTIES EXPRESSED OR IMPLIED ALL OF WHICH ARE HEREBY DISCLAIMED TO THE FULLEST EXTENT PERMITTED BY APPLICABLE LAW. WITHOUT LIMITING THE GENERALITY OF THE FOREGOING DISCLAIMER AND EXCEPT AS OTHERWISE SET FORTH IN THIS WARRANTY, ***OGSI*** DISCLAIMS ALL WARRANTIES OF MERCHANTABILITY WITH RESPECT TO THE PRODUCTS AND ALL WARRANTIES OF FITNESS FOR A PARTICULAR PURPOSE. THE WARRANTY OF ***OGSI*** AS SET FORTH HEREIN IS FOR THE BENEFIT OF THE ORIGINAL USER OF THE PRODUCTS AND IS NOT TRANSFERABLE WITHOUT THE PRIOR EXPRESS WRITTEN CONSENT OF ***OGSI***.

The ***OGSI*** Warranty provides the following:

1) ***OGSI*** shall repair or replace the Products free of charge to the original user where defects in the material and/or workmanship are evident at the time of delivery. Such replacement of the Products does not include damages incurred in shipping the Products. If shipping damage is evident, the original user should contact the shipper immediately. ***OGSI*** will pay for shipping the Products to the original user as well as returning damaged/defective Products to ***OGSI***. Once the Products are repaired, ***OGSI*** will ship the Products back to the original user and cover all costs incurred in shipping.

2) ***OGSI*** shall repair or replace the Products (excluding filter elements and sieve material) free of charge to the original user where defects in material and/or workmanship become evident between the time of delivery to the original user and one (1) year from the date of delivery to the original user. ***OGSI*** will pay for shipping the Products to the original user as well as returning damaged/defective Products to ***OGSI***. Once the Products are repaired, ***OGSI*** will ship the Products back to the original user and cover all costs incurred in shipping. In no event shall ***OGSI*** have any responsibility or liability for the cost of labor for the removal of component parts or equipment that constitute part of the Products, packaging of the component parts or equipment that constitute part of the Products or the re-installation or replacement of the component parts or equipment that constitute part of the Products.

3) The warranty provided by ***OGSI*** to the original user covers parts and equipment specifically manufactured by ***OGSI*** and used as components or equipment that constitute part of the Products. The warranty on parts or equipment manufactured by third parties and included as part of the Products *(e.g., air dryers, air compressors, oxygen compressors, instrumentation, etc.)* is limited to the respective original warranties of such third parties.

Note: A *Return Authorization Number* must be obtained from ***OGSI*** prior to the return shipment of the Product or any component parts or equipment of the Products. The *Return*

Authorization Number must be visibly written on the outside of the package of the returned Products, component parts or equipment as applicable or ***OGSI*** will not accept the return. **Note:** A *Credit Certificate* will be created for all Warranty Exchange transactions. ***OGSI*** will provide the *Credit Certificate* with an invoice at the time of shipment to the original user. The *Credit Certificate* must be included in the package to ***OGSI*** with the returned products within 30 days of the date of the invoice. Failure to return Warranty Exchange Products to ***OGSI*** within 30 days will make the Warranty Exchange process void and payment for Products will be billed and due on receipt.

Note: The warranties of ***OGSI*** as set forth herein shall also become null, void and not binding on ***OGSI*** if a defect or malfunction occurs in the Products or any part of the Products as a result of:

a) A failure to provide the *Required Operating Conditions* for the Products (*See Page 30)*

b) Repair, attempted repair, adjustment or servicing of the Products, or any component parts or equipment that constitutes part of the Products by anyone other than an authorized representative of ***OGSI***. The authorized service representative must obtain prior approval from ***OGSI***'s Service Manager before performing any warranty work.

c) External Causes (e.g. flood, hurricane, tornado, fire, any natural disaster, or any event deemed an act of God).

Molecular Sieve Replacement:

The breakdown of the molecular sieve inside the generator (dusting of the sieve) only occurs if excess water/oil is entrained in the feed air stream. Under no circumstances is the molecular sieve covered under any warranty by ***OGSI***. If sieve dusting occurs on your machine, check the air compressor, air dryer and filter elements.

Other Matters:

OGSI is not liable for any special, indirect, punitive, economic, incidental or consequential losses or damages including without limitation, loss of use, malfunction of ***OGSI*** products, replacement oxygen charges, delays or lost savings related to the Products or otherwise even if ***OGSI*** shall have been advised of the possibility of such potential losses or damages.

Limits of Liability

OGSI Oxygen Generator products shall not be used for breathable or medical oxygen applications, unless they are assembled with the appropriate support equipment, tested, and operated in compliance with either American, Canadian or ISO norms for hospital oxygen systems.

Safety Guidelines

Unpacking

Ensure that the unit is ***NOT*** connected to an electrical outlet.

Tools Needed:

2 Flat Blade Screwdriver

$^{7}/_{16}$" Socket

$^{1}/_{2}$" Socket

Drive Ratchet

- Cut the nylon bands that hold the **CFP-15+/15E+** unit in place.
- Remove the two (2) hex head lag bolts ($^{1}/_{2}$") from the two (2) bottom tabs.
- Remove the Styrofoam protector covering the touch screen.
- Open the **CFP-15+/15E+** unit cabinet by loosening the three (3) spring loaded clips on the front, right side of the unit with the $^{7}/_{16}$" socket. Open the door.
- Remove the Styrofoam pieces from either side of the air compressor.
- Remove the interconnecting hose/fill whip placed on the micro booster.

The unit is now ready for installation. Please refer to the product manual for further instructions.

Handling of Compressed Gas Cylinders

Many of the following procedures for the handling, storage, and utilization of compressed gas in cylinders are taken from material furnished by the Compressed Gas Association, which complies with **OSHA** standards.

Always ensure that compressed gas cylinders are securely strapped or chained in place to prevent tipping or falling. Do not store near elevators, stairs, or passageways.

Do not place cylinders in a position where they might become part of an electric circuit. When electric welding is taking place, precautions should be taken to prevent accidental grounding of cylinders, permitting them to be burned by electric welding arc.

If visual inspection indicates obvious damage, the cylinder should be returned to the supplier without any attempt at using the machine.

If cylinder leaks, other than normal venting, and the leak cannot be corrected by tightening a valve gland or packing nut, the valve should be closed and a tag attached stating that the cylinder is not serviceable. Remove the cylinder outdoors to a well-ventilated or open area, notify the supplier, and follow the supplier's instructions for the return of the cylinder.

Keep the cylinder valve closed at all times except when in active use. When removable caps are provided for valve protection, they should not be removed except for active use. Remember to replace removable caps when not in use.

Cylinders should not be dropped or permitted to strike each other or any other surface. Do not drag or slide cylinders; use a suitable hand truck, fork truck, roll platform or similar device, firmly securing the cylinders for transporting.

Do not store oxygen cylinders with flammable gas cylinders. Stored oxygen and fuel gas cylinders should be at least **20 ft** apart; preferably separated by a fire resistant partition.

For additional information refer to the CGA publications that can be found at ***http://www.cganet.com***

See also ISO publication 10083 that can be found online at ***http://www. iso.org***

Operating

OGSI cylinder filling plants are self-contained systems for the production of high concentration oxygen. Although oxygen itself is not combustible, it can be very dangerous. It greatly accelerates the burning of combustible materials.

Precautions should be taken to avoid a fire in the area of the cylinder filling plant.

Smoking should not be permitted in the area where the cylinder filling plant is located.

All oxygen connections and hoses should be kept clean and free of grease, oil and other combustible materials.

Valves controlling oxygen flow should be opened and closed slowly to avoid the possibility of fires or explosions that can result from adiabatic compression.

Do not attempt to modify or enhance the performance of a cylinder filling plant in any way.

When bleeding a tank or line, stand clear and do not allow oxygen to embed itself within clothing. A spark could ignite the clothing violently.

Product Information

Features and Applications

The ***OGSI*** Model **CFP-15+/15E+** is a self-contained oxygen cylinder filling plant that uses Pressure Swing Adsorption (PSA) technology. It allows users to generate medical-grade oxygen (conforming to United States Pharmacopeia (USP) XXII oxygen 93% Monograph). It concentrates oxygen up to **93% (± 3%)** purity.

Features

Easy to use

- Just mount it on the wall and connect to an electrical outlet.
- A digital color touch screen display shows all the information required to monitor the manufacturing process of oxygen

Dependable

- The unit has two internal compressors, two sieve beds, small storage tank and automated PLC and other connections which are all enclosed within the unit. The unit can be operated continuously for up to **18** hours a day. The recommended duty cycle is **75%** per day.

Durable

- The unit is built in a self-contained powder coated steel cover and operates quietly.

Compact

- The unit measures only **30″ x 16″ x 36″** and can be easily mounted on a wall.

Safe

- The unit performs a continuous series of self-diagnostic tests as it runs. It shuts down automatically if there is a drop in oxygen purity and displays a visual alarm on the screen.

Economical

- The **CFP-15+/15E+** unit saves at least **20%** of oxygen expenses. It eliminates the costs involved in transportation, maintenance, hazmat fees, cylinder rental fees and wasted supply of oxygen. Conserve and control your oxygen supply.

Applications

The **CFP-15+/15E+** can be used in various applications. A few examples are given below.

EMS (Emergency Medical Services)

Fire Department

Hospitals

Scuba Tank Filling/Nitrox

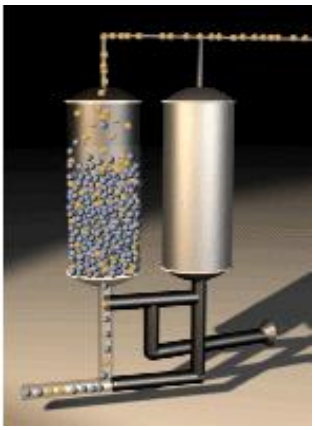
Nursing Homes

Pressure Swing Adsorption (PSA) Technology

An ***OGSI*** cylinder filling plant is an on-site oxygen generating machine capable of producing oxygen on demand in accordance with your requirements. In effect, it separates the oxygen (21%) from the air it is provided and returns the nitrogen (78%) to the atmosphere through a waste gas muffler. The separation process employs a technology called **Pressure Swing Adsorption (PSA)**. At the heart of this technology is a material called Molecular Sieve (Zeolite). This sieve is an inert, ceramic-like material that is designed to adsorb nitrogen more readily than oxygen. Each of the two beds that make up the generator contains this sieve. The process is described below.

Stage 1

Compressed air is fed into the first molecular sieve bed. Nitrogen is trapped, while oxygen is allowed to flow through.

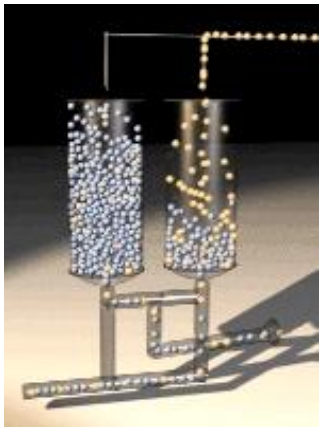


Stage 2

When the sieve in the first bed becomes full of nitrogen, the airflow is then directed into the second bed.

Stage 3

As the second bed separates the oxygen from the nitrogen, the first bed vents its nitrogen into the atmosphere.



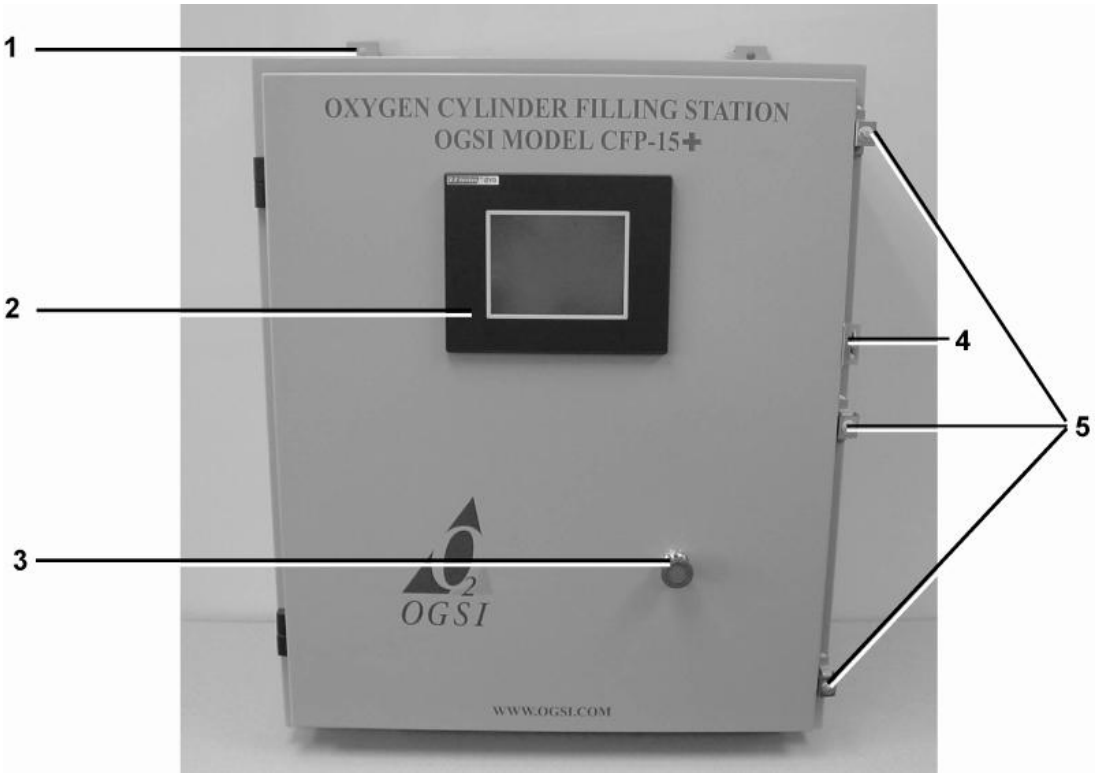
Stage 4

Compressed air is once again fed into the first bed and the process is repeated continuously. A constant flow of oxygen is produced.

This air separation process is reliable and virtually maintenance-free. The molecular sieve will last indefinitely, as long as it does not become contaminated with water or oil vapors. This is why regular filter element replacement is crucial to trouble-free operation. The filter elements are very inexpensive and require semi-annual maintenance.

External Components Drawing

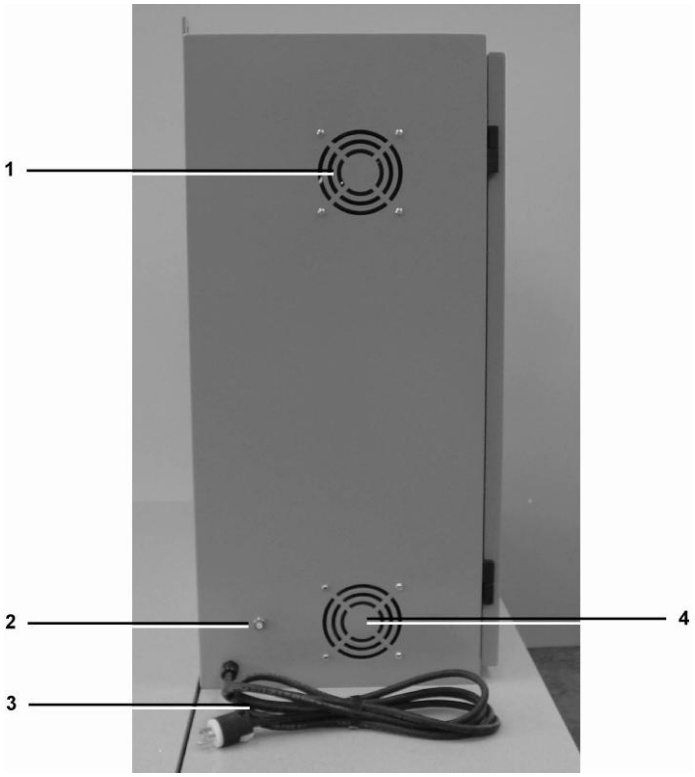
CFP-15+ Front View



1. **Wall Mounting Bracket (2 Bottom Brackets Not Shown)**
2. **Touch Screen**
3. **Emergency Stop Button**
4. **Lock Hasp**
5. **Door Latch (3)**

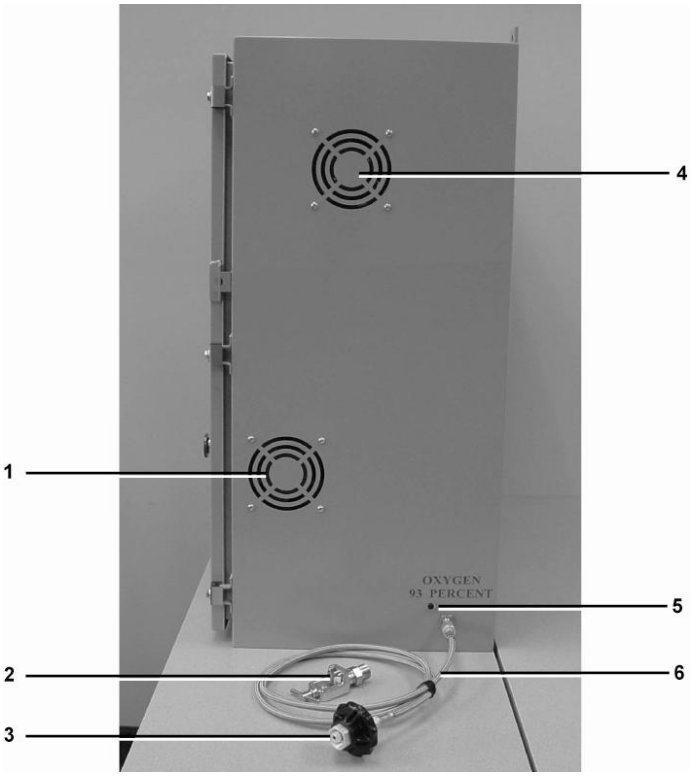
Side Views

Left



1. **Outlet Fan**
2. **Air Compressor Thermal Reset**
3. **Power Cord**
4. **Inlet Fan**

Right



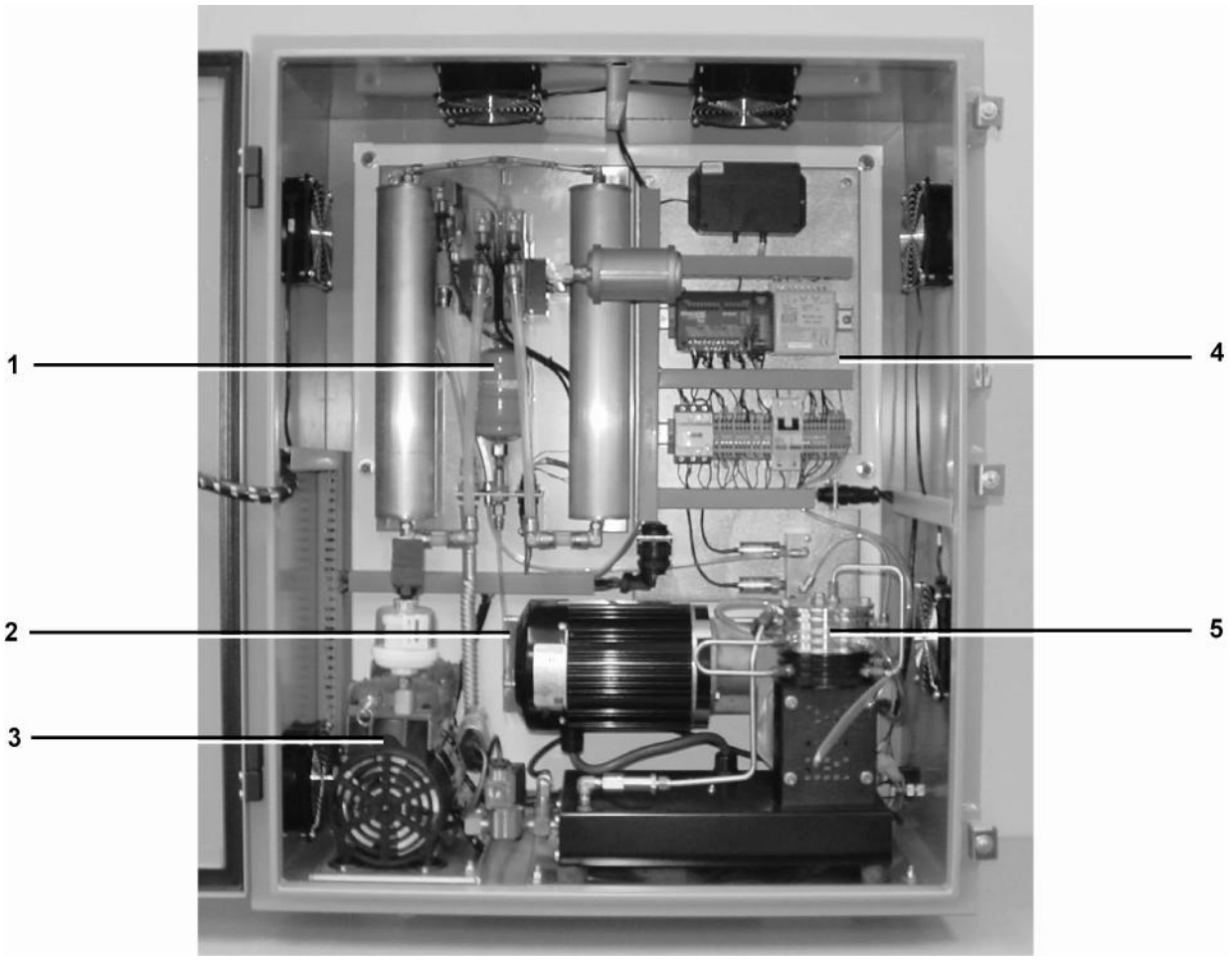
1. **Inlet Fan**
2. ***CGA* 540 to *CGA* 870 Adapter**
3. ***CGA* 540 Fitting**
4. **Outlet Fan**
5. **Oxygen Compressor Thermal Reset**
6. **Oxygen Outlet Hose**

External Components Description

Touch Screen	The touch screen is the main user interface with the machine. All controls are programmed within the touch screen.
Emergency Stop Button	This button allows the generator power to be instantly shut down in the event of an emergency. This button should not be used to turn off the equipment under normal conditions.
Cooling Fans	The fans maintain air flow through the enclosure to prevent excessive high temperature.
Air Compressor Thermal Reset Switch	This switch allows the air compressor to be reset in the event of a thermal overload fault.
Power Cord	The standard power cord is designed for use on **115 VAC/60 Hz** electrical systems and comes with a three-pronged ground fault protected plug. For **230 VAC (**optional**)**, a plug of local configuration will need to be installed by the end-user.
Oxygen Compressor Thermal Reset Switch	This switch allows the oxygen compressor to be reset in the event of a thermal overload fault.
Feed Air Bulkhead ***(CFP-15E+ Only)***	This is the pressurized feed air inlet fitting ($^1/_4$") to the machine.
High Pressure Oxygen Outlet Bulkhead	This is the high pressure oxygen outlet fitting ($^1/_4$") to the manifold.

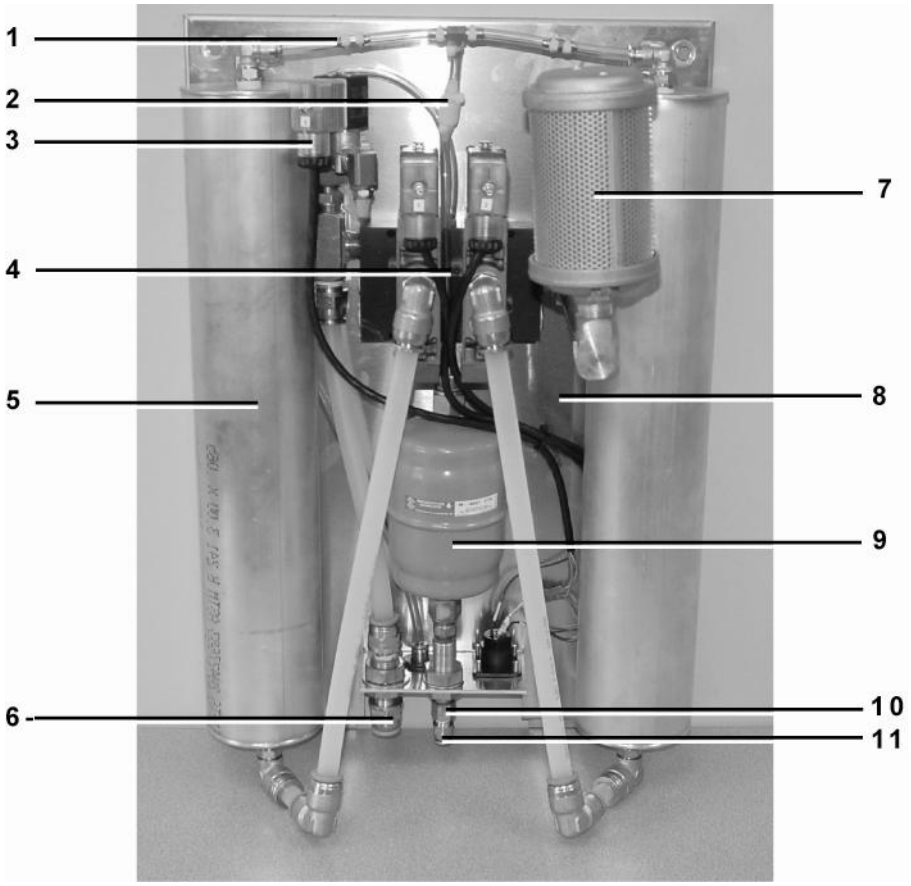
Internal Components

Front View



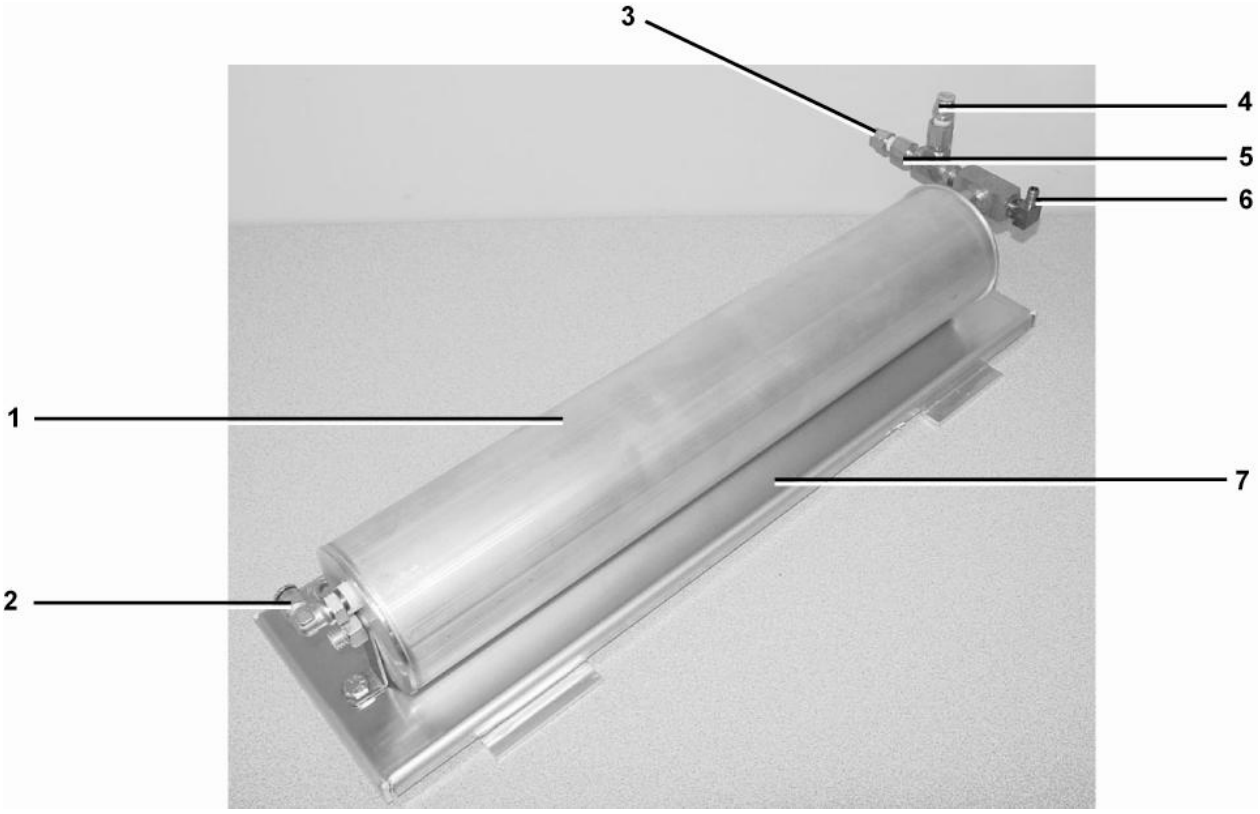
1. **OEM Panel Assembly**
2. **Storage Tank Assembly (Behind Oxygen Compressor)**
3. **Air Compressor Assembly**
4. **Electrical Panel Assembly**
5. **Oxygen Compressor Assembly**

OEM Panel Assembly



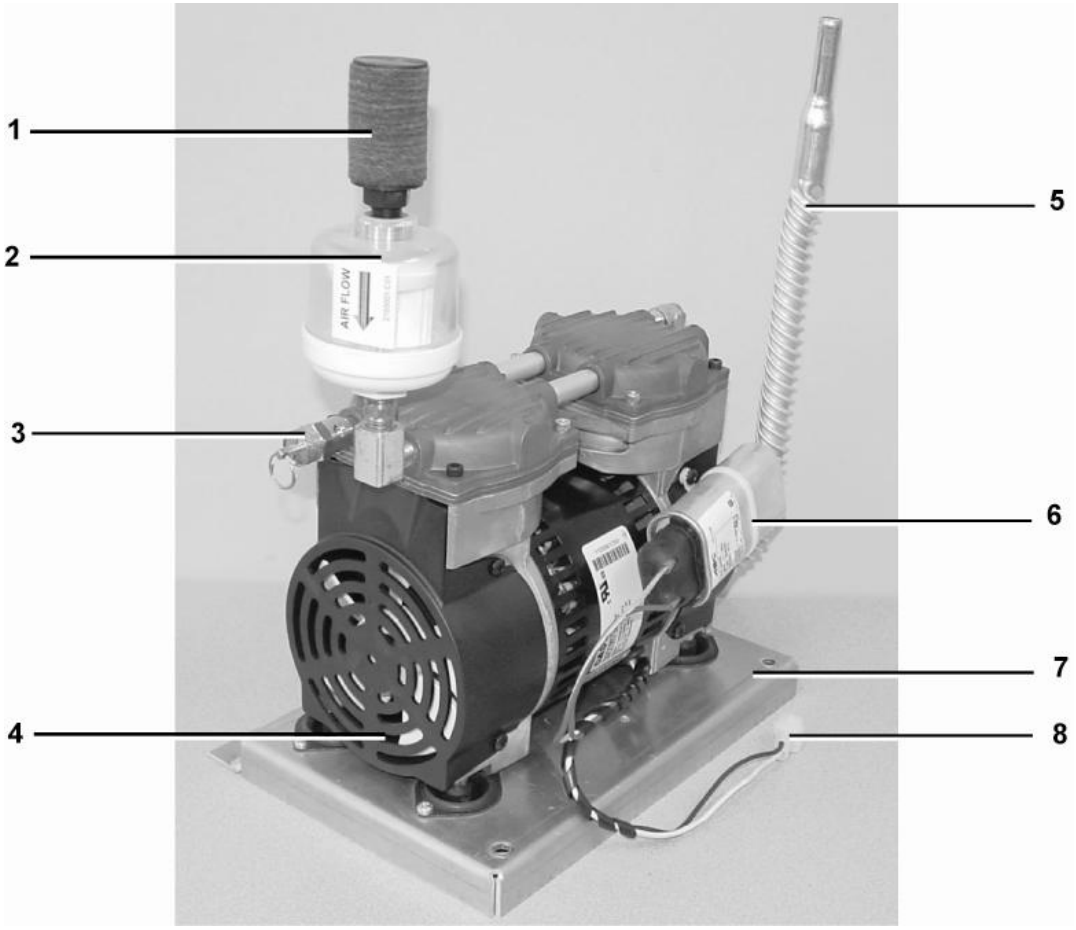
1. **Purge Orifice**
2. **Check Valve**
3. **Air Vent Valve**
4. **Valve Block**
5. **Sieve Bed**
6. **Air Inlet**
7. **Exhaust Muffler**
8. **Base Plate**
9. **Surge Tank**
10. **Oxygen Outlet Orifice**
11. **Oxygen Outlet**

Storage Tank Assembly



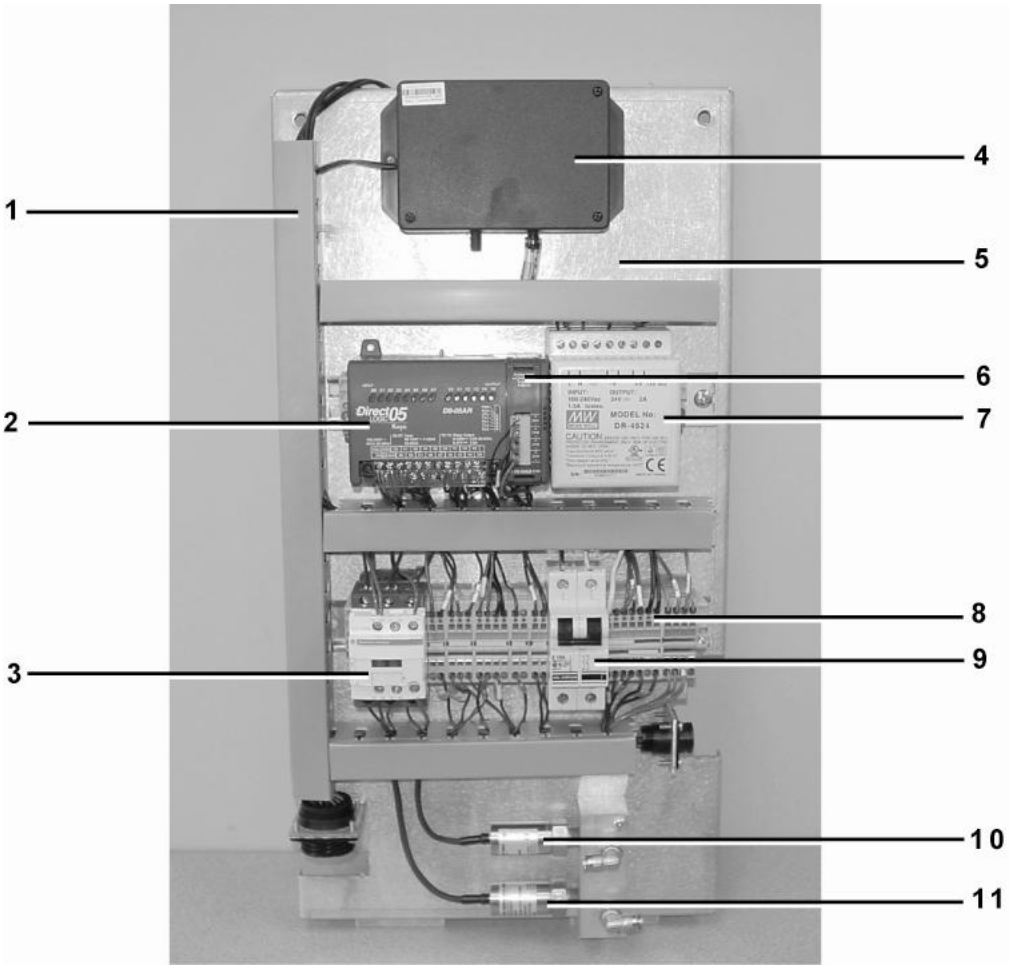
1. **Storage Tank**
2. **Inlet from Oxygen Generator**
3. **Oxygen Purity Sensor Feed**
4. **Oxygen Pressure Sensor Feed**
5. **Oxygen Purity Sensor Orifice**
6. **Outlet to Oxygen Compressor**
7. **Base Plate**

Air Compressor Assembly



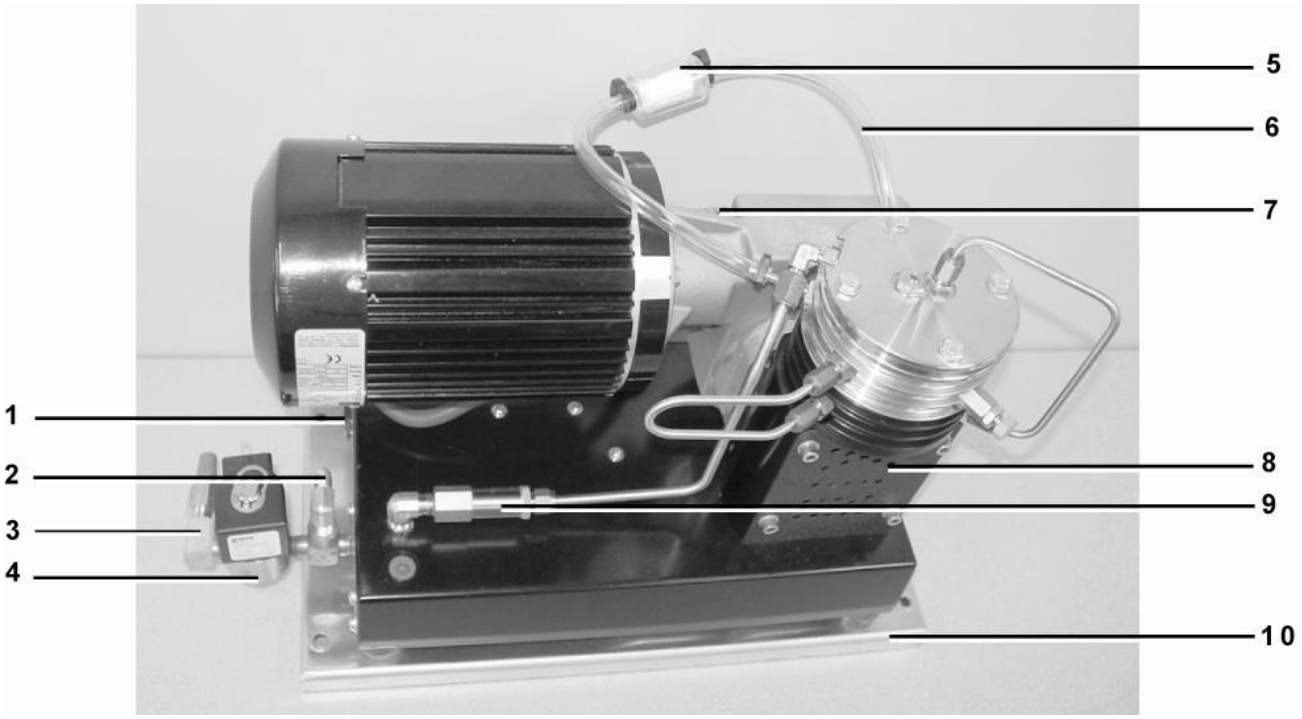
1. **Pre-filter**
2. **Inlet Air Filter**
3. **Safety Relief Valve**
4. **Air Compressor**
5. **Heat Exchanger**
6. **Capacitor**
7. **Base Plate**
8. **Power Connector**

Electrical Panel Assembly



1. **Wire-way**
2. **PLC**
3. **Main Contactor**
4. **Oxygen Sensor**
5. **Base Plate**
6. **Sensor Input Card**
7. **24 V Power Supply**
8. **Terminal Blocks**
9. **Main Circuit Breaker**
10. **Air Pressure Sensor**
11. **Low Oxygen Pressure Sensor**

Oxygen Compressor Assembly



1. **Power Connector**
2. **High Pressure Oxygen Outlet**
3. **Vent Orifice**
4. **Oxygen Compressor Vent Valve**
5. **HEPA Filter**
6. **Low Pressure Oxygen Inlet Tube**
7. **Shipping Plug (Remove Before Use)**
8. **Oxygen Compressor**
9. **High Pressure Oxygen Outlet Filter**
10. **Base Plate**

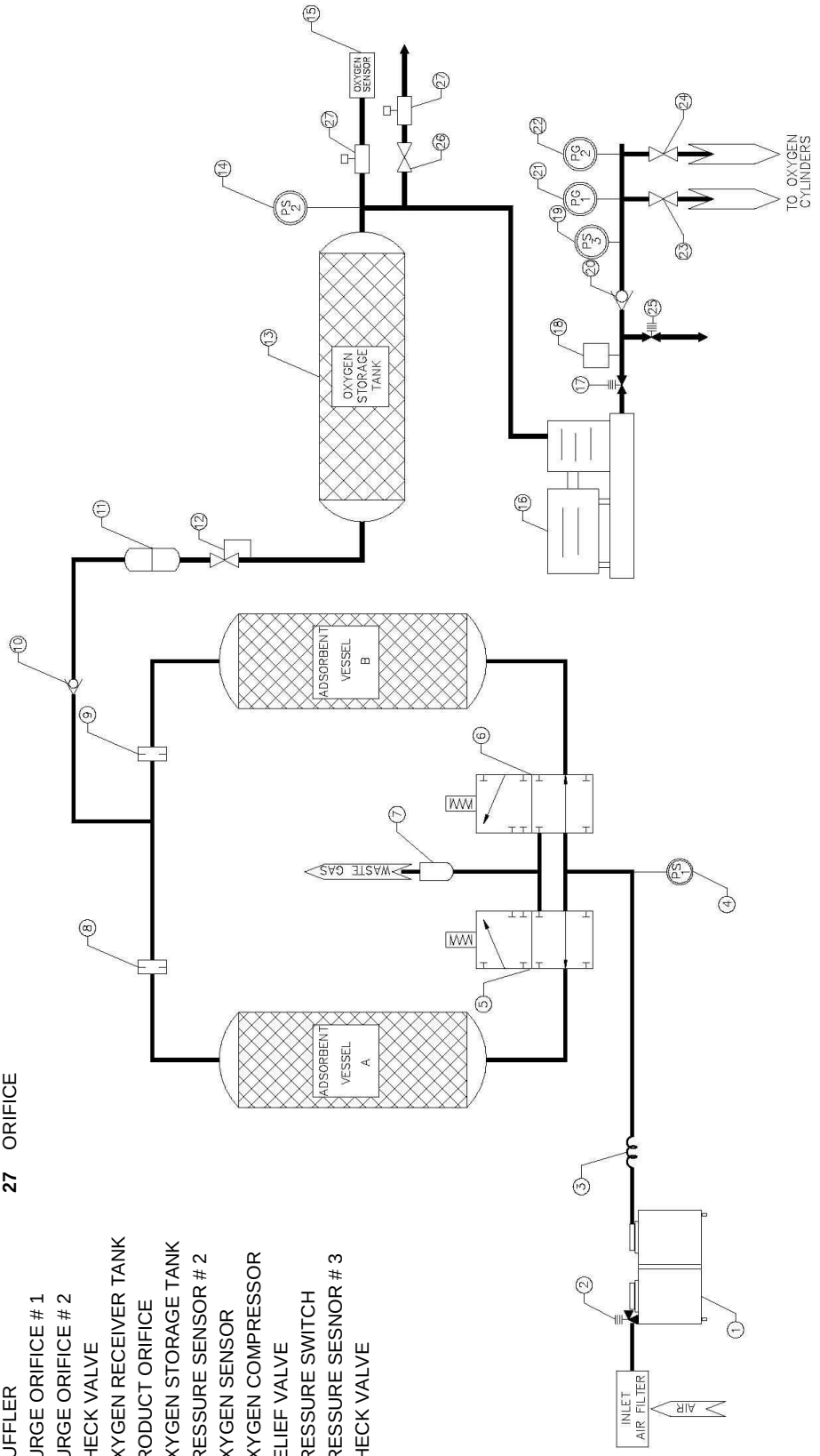
Internal Components Description

Purge Orifice	The purge orifice allows for a small amount of produced oxygen to vent into a sieve bed, forcing nitrogen out and preparing the sieve for another cycle.
Check Valves	The check valves are one way flow through valves that allow oxygen to flow through them in one direction only.
Valve Block	The valve block holds the main valves that control the direction of airflow in the machine. These are the feed and waste valves for each bed. They direct feed air to each bed during oxygen production and waste nitrogen through the muffler to regenerate the sieve. The cycle continues while the unit operates.
Sieve Beds	These beds contain the molecular sieve that performs the air separation process. Exposing the internal sieve material to the atmosphere causes contamination. If the sieve becomes contaminated the beds can be easily replaced.
Exhaust Muffler	The exhaust muffler is used to silence the exhaust noise that occurs as a result of the sieve beds rapidly depressurizing to atmospheric pressure, releasing nitrogen.
Surge Tank	The oxygen surge tank is used as a small reservoir for oxygen storage before the product gas flows through the product orifice. It helps remove the pulsations of the system and give smoother outlet flow.
Storage Tank	The storage tank serves as a reservoir for the oxygen, prior to entering the oxygen compressor.
Oxygen Purity Sensor Orifice	The control orifice controls the flow rate of oxygen going into the storage tank.
Inlet Air Filter	The air filter keeps dust and dirt from entering the compressor and needs to be changed twice a year in normal environments to maintain the unit's performance. It should be changed more often in dirty, oily areas. Four times a year is recommended.
Safety Relief Valve	The safety relief valve vents excessive pressure to the atmosphere.

Air Compressor	The air compressor supplies the feed air to the sieve beds. It is held in place by four bolted rubber feet and can be easily replaced when necessary. It should work as designed for a minimum of 10,000 hours and will last 20,000 hours in many cases.
Heat Exchanger Tube	The heat exchanger tube runs in front of the air compressor and delivers the feed air from the air compressor to the valve block. The tube has been designed to allow significant air temperature reduction before the air enters the sieve beds, improving performance.
Motor Start Capacitor	The motor starting capacitor is connected directly to the motor of the air compressor. It is used to reduce the starting electrical current surge into the motor.
PLC	The PLC (Programmable Logic Controller) processes inputs and outputs to and from the system components and communicates with the touch screen.
Main Contactor	The main contactor supplies power to the oxygen compressor and starts the fans and air compressor when a signal is received from the PLC.
Oxygen Sensor	The oxygen sensor gives a variable output current to the PLC at different levels of oxygen purity. The PLC then communicates this signal to a virtual gauge in the touch screen.
24 VDC Power Supply	The power supply converts **115 VAC** signal into **24 VDC**, which is used by transducers, oxygen sensor and touch screen.
Terminal Blocks	The terminal blocks distribute the electrical power and signals as required to the different components of the system.
Main Circuit Breaker	The circuit breaker will trip to prevent excess current from passing into the system which could damage the equipment.
Oxygen Compressor Vent Valve	This valve simulates the draw of the oxygen compressor prior to its initialization, by temporarily venting a small amount of the product gas.

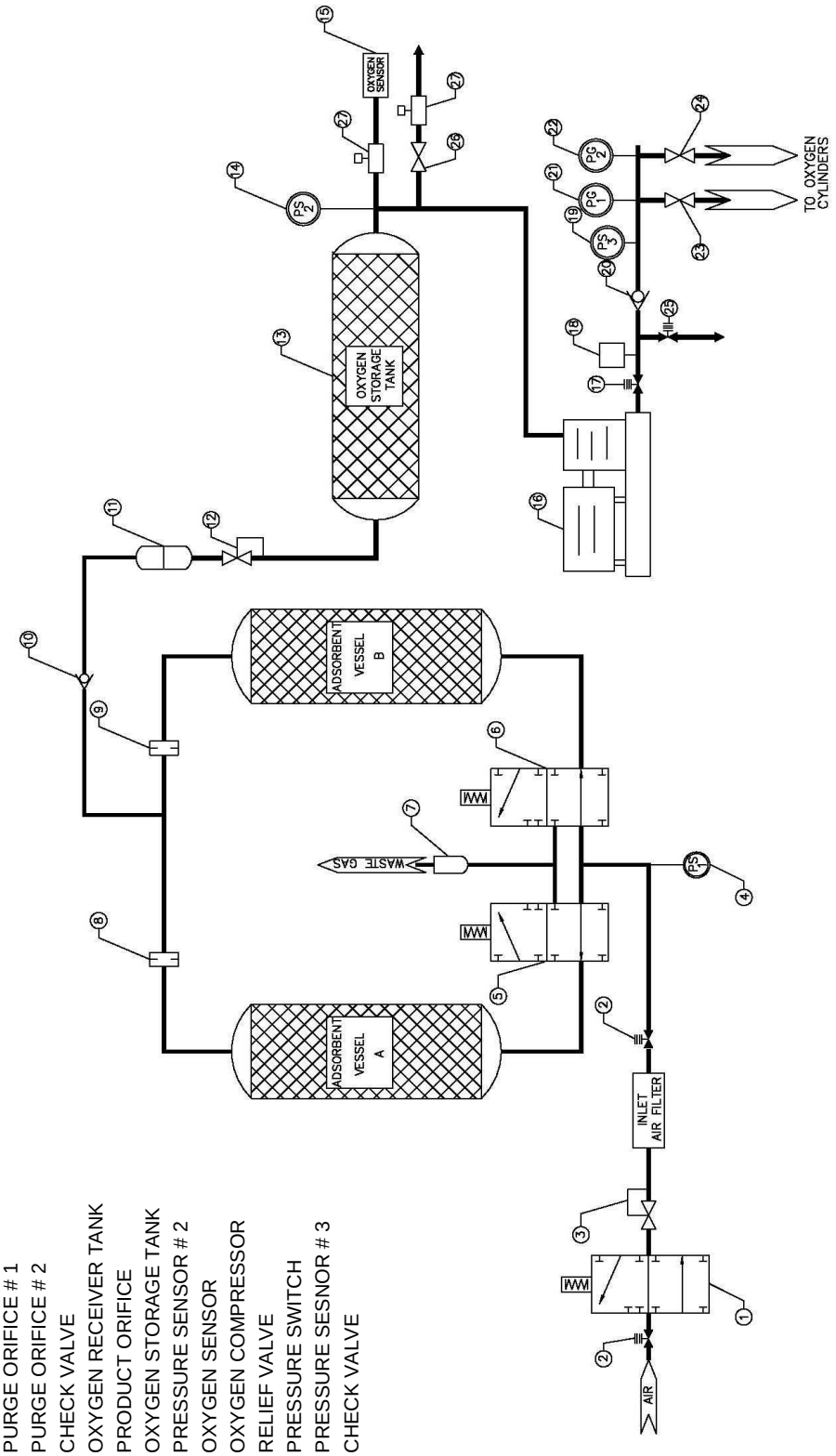
Oxygen Compressor	The **RIX** oxygen compressor boosts the low pressure oxygen from the typical **5 psi (0.3 bar)** up to **2200 psi (152 bar)**. It is a three-stage compressor with a self-contained motor start capacitor, relay and pressure relief valves.
Timed Shut-down Oxygen Relief Valve	This valve vents the oxygen compressor head pressure for ten seconds upon shut-down.
Thermal Overload	The thermal switches prevent damage to the motor due to excess current draw. If a thermal overload switch trips, it may be reset by pressing the exposed button.
Transducers	The transducers give a variable output current to the PLC at different pressures. The PLC then communicates this signal to a virtual gauge in the touch screen.
Transducer Manifold	The transducer manifold distributes pressure, supplies connections to tubing and provides a mounting surface for the transducers.
Cooling Fans	The cooling fans are used to draw air into the unit and to remove heat from inside the enclosure. The fans operate while the unit runs.
Feed Air Pressure Regulator/Coalescing Filter *(On CFP-15E+ only)*	This unit acts as a final guard against any contaminants in the feed air supply and sets the feed air to proper pressure.
Feed Air Shutoff Valve *(On CFP-15E+ only)*	This valve starts and shuts off the flow of feed air into the machine.

Process Flow Schematic: CFP-15+

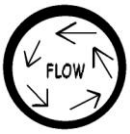


1 FEED AIR COMPRESSOR
2 RELIEF VALVE
3 HEAT EXCHANGER
4 PRESSURE SENSOR # 1
5 VALVE # 1
6 VALVE # 2
7 MUFFLER
8 PURGE ORIFICE # 1
9 PURGE ORIFICE # 2
10 CHECK VALVE
11 OXYGEN RECEIVER TANK
12 PRODUCT ORIFICE
13 OXYGEN STORAGE TANK
14 PRESSURE SENSOR # 2
15 OXYGEN SENSOR
16 OXYGEN COMPRESSOR
17 RELIEF VALVE
18 PRESSURE SWITCH
19 PRESSURE SESNOR # 3
20 CHECK VALVE
21 MANIFOLD PRESSURE GAUGE # 1
22 MANIFOLD PRESSURE GAUGE # 2
23 MANIFOLD VALVE # 1
24 MANIFOLD VALVE # 2
25 HIGH PRESSURE UNLOADING VALVE
26 PURGE VALVE
27 ORIFICE

Process Flow Schematic: CFP-15E+



1 FEED AIR COMPRESSOR
2 RELIEF VALVE
3 HEAT EXCHANGER
4 PRESSURE SENSOR # 1
5 VALVE # 1
6 VALVE # 2
7 MUFFLER
8 PURGE ORIFICE # 1
9 PURGE ORIFICE # 2
10 CHECK VALVE
11 OXYGEN RECEIVER TANK
12 PRODUCT ORIFICE
13 OXYGEN STORAGE TANK
14 PRESSURE SENSOR # 2
15 OXYGEN SENSOR
16 OXYGEN COMPRESSOR
17 RELIEF VALVE
18 PRESSURE SWITCH
19 PRESSURE SESNOR # 3
20 CHECK VALVE
21 MANIFOLD PRESSURE GAUGE # 1
22 MANIFOLD PRESSURE GAUGE # 2
23 MANIFOLD VALVE # 1
24 MANIFOLD VALVE # 2
25 HIGH PRESSURE UNLOADING VALVE
26 PURGE VALVE
27 ORIFICE



Process Flow Description

The normal flow of air through the **CFP-15+/15E+** unit is shown on the previous two pages in the Process Flow Schematic Drawings. As you can see once the incoming air is filtered and compressed in the **CFP-15+** unit or regulated to the proper pressure in the **CFP-15E+** unit, it is directed into one of the two sieve beds. As the air enters the bed, the nitrogen is adsorbed by the sieve and the oxygen passes through as product gas to the storage tank. Each bed produces oxygen until the sieve in that bed is saturated with nitrogen. When this occurs, the feed airflow is directed to the other bed, which continues the production process. While the second bed is producing oxygen, the first bed is releasing into the atmosphere the nitrogen it adsorbed, under very low pressure through a waste gas muffler.

From the storage tank, the oxygen product gas passes through a factory set product orifice and into a storage tank. This storage tank serves as a reservoir for the oxygen prior to entering the high pressure oxygen compressor. The oxygen product gas is then delivered to the high pressure oxygen compressor where it is compressed into cylinders up to **2200 psi (152 bar)**. The system will automatically de-energize when this pressure is reached.

Unit Specifications

Performance

Oxygen Volume	1-15 SCFH (0.4 Nm^3/h) 1-7 LPM
Oxygen Pressure	Up to 2200 psi (152 bar)
Oxygen Purity	United States Pharmacopeia (USP) XXII oxygen 93% Monograph
• *Oxygen Concentration* • *CO_2 Output* • *CO Output*	93% (± 3%) ≤ 300 ppm ≤ 10 ppm
Oxygen Dew Point	- 60° F (-51°C)
Feed Air Requirement ▪ *CFP-15+* ▪ *CFP-15E+*	 None, compressor included 4.9 SCFM @ 40 psi (6.3 Nm^3/h @ 2.8 bar)
Response Time	Approximately **5** minutes to attain maximum purity after initial start-up or extended shut-down

Physical

Oxygen Outlet Fitting	$^1/_4$" FNPT Bulkhead
Air Inlet Fitting ▪ *CFP-15+* ▪ *CFP-15E+*	 None $^1/_4$" FNPT Bulkhead
Sound Levels ▪ *CFP-15+* ▪ *CFP-15E+*	 60 dBA @ 1 m 58 dBA @ 1 m
Dimensions	30 x 16 x 36 in (W x D x H) 76 x 41 x 91 cm (W x D x H)
Weight ▪ *CFP-15+* ▪ *CFP-15E+*	 245 lb (111 kg) 230 lb (104 kg)

Continued

Continued from Page 26

Power Requirement

CFP-15+	
▪ Standard (Domestic)	115 VAC, 60 Hz, Single Phase 15 A
▪ Optional (International)	230 VAC, 50/60 Hz, Single Phase, 10 A
CFP-15E+	
▪ Standard (Domestic)	115 VAC, 60 Hz, Single Phase, 9 A
▪ Optional (International)	230 VAC, 50/60 Hz, Single Phase, 4.5 A

Safety Precautions

It is very important that you read the precautions below and make yourself aware of the hazards of oxygen in general. While it can be handled and used very safely, it can also be mishandled or applied incorrectly causing dangerous situations.

Oxygen is a fire hazard. It can be very dangerous as it vigorously accelerates the burning of combustible materials. To avoid fire and/or the possibilities of an explosion, oil, grease or any other easily combustible materials must not be used on or near the **CFP-15+/15E+** unit. **DO NOT SMOKE NEAR THE UNIT**. The unit should be kept away from heat and flames. Individuals who have experience handling oxygen systems should become the designated operators of the **CFP-15+/15E+** unit within your facility**.**

In crucial applications, it is important to have a backup supply of oxygen since the generator does not come with any reserve storage tank and requires electrical power to operate. ***Therefore, during power outages oxygen will not be produced.***

Do not use extension cords to bring power to the generator. It is also important to use only a properly grounded outlet**.**

High pressure oxygen may present a hazard. Always follow proper operating procedures, and ***open valves slowly***. Rapid pressurization may result in personal injury. Safety glasses and hearing protection are required when venting oxygen under high pressure.

Ensure that the oxygen outlet stream is not directed toward anyone's clothing.
Oxygen will embed itself in the material and one spark or hot ash from a cigarette could violently ignite the clothing.

Pre-Installation

Before installing the ***OGSI* CFP-15+/15E+** unit, it is necessary to consider the location, space available and power supply for the machine.

1) Locating the **CFP-15+/15E+ :**

- The machine should be located in an area that is indoors and remains between **40°F** (**5°C**) and **100°F** (**38°C**). **Setting up the machine outdoors or in an area that is not normally within this temperature range will void the *OGSI* warranty.**
- There should also be a distance of at least **18 in** (**45.7 cm**) between the machine and any side wall in the room that it will be located in. This is to ensure that airflow into the machine through the cooling fans is not restricted.
- ***(*CFP-15E+ *Only)*** The machine must be located within reach of an air supply line, as this machine requires an external pre-existing source of pressurized air at **40 psi (2.8 bar)**.

2) Space Available for the **CFP-15+/15E+:**

- If the machine is going to be set up in a room that is small, (less than **1000 ft^3**or **28.3 m^3**), that room should be well ventilated (at least **5** air changes in the room per hour). The generator will be discharging nitrogen into the atmosphere of the room and a nitrogen build up could be dangerous to people entering the room. If the generator is placed in a small closet, the air in that closet will become enriched with nitrogen. As the generator continues to run, it would become more and more difficult for it to separate the oxygen from the air because oxygen will make up a smaller and smaller fraction of the air that is fed into the generator. This will stop the machine from functioning correctly and purity of the oxygen produced will decrease.

3) Power Supply for the **CFP-15+/15E+:**

- The machine should be positioned within **8 ft** (**2.2 m**) of the electrical outlet that will power it. The electrical outlet system to which the ***OGSI*** cylinder filling plant is connected should be used exclusively for that purpose and no other electrical appliances should be connected to it.

Required Operating Conditions

Location of Machine:

The **CFP-15+/15E+** unit is intended for use indoors in a commercial or light industrial setting. The enclosure meets **NEMA 12** protection guidelines, which provides a degree of protection against dust, falling dirt and non-corrosive liquids.

Feed Air/Ambient Air Quality:

The life of any PSA **CFP-15+/15E+** unit is directly related to the air quality that is fed into it. Hot, humid, dirty, oily air deteriorates and degrades the performance of the molecular sieve. In order to preserve the effectiveness and extend the life of the generator, precautions must be taken to ensure that the air provided is cool, dry, clean and oil-free.
Changing the inlet air filter is a simple and easy way to provide the unit with some protection. It is advisable to set up the unit in an air-conditioned or a well-ventilated area. The room should also be free of toxic gases and high concentrations of hydrocarbons, especially carbon monoxide. Humid, oily areas should be avoided as installation sites as much as possible.

Ambient Air Temperature:

The machine is designed for use over a temperature range of **40°F** to **100°F** (**5°C** to **38°C**). Since hot air has the ability to hold more water in the form of humidity than cool air, operating the units in hot areas will reduce the effective life of the molecular sieve.

Note: Operation outside of this temperature range will not be warranted by ***OGSI***.

Electrical Power:

On U. S. models, the power for the control circuitry of the **CFP-15+/15E+** unit is a single-phase electrical supply of **115 VAC** and about **15 A** at a frequency of **60 Hz**. This equates to approximately **1800 W** of power. It is required that a **15 A** circuit be dedicated to each **CFP-15+/15E+** unit. Additionally, the unit must be plugged into this circuit using only the supplied power cord, and without additional extension cords.

Feed Air Requirements (CFP-15E+ Only):

4.9 SCFM at **40 psi (6.3 Nm^3/h** at **2.8 bar)** incoming pressure is required for proper functioning of this machine. The air should be cool and clean, filtered to remove any contaminants such as dust particles and moisture. It is recommended that it meet the requirements of ***ISO8573.1 Class 4***.

Positioning:

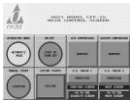
The unit must be operated in an upright position only, with no obstruction blocking airflow around the unit.

Set-up & Installation

Although every **CFP-15+/15E+** unit is thoroughly tested and checked before it is shipped from our facility, the following checks are necessary to ensure that none of the internal components have been damaged in shipment. This check should take less than five minutes to perform. *(Refer to '**Initial Inspection**' on Page 2 and '**Unpacking Instructions**' on Page 5 before reading the instructions below)*

Make a visual inspection of the machine and make sure all parts are properly connected. (*Refer to 'Components' section*)

Connect the unit to an electrical outlet. A receptacle plug of local configuration will need to be attached first if the machine has been shipped outside North America.



Ensure that the touch screen is powered and a display is visible. Consult the troubleshooting guide in this manual (*See Pages 33-34*) for any problems encountered.

After entering a password and selecting a language, start the machine by pressing both the **OPERATING MODE** (**AUTOMATIC**), and then the **ON/OFF** buttons.

Listen for the sound of the compressor and six cooling fans to start running, if you do not hear them within a few seconds, shut the machine down immediately by pressing the **ON/OFF** button and call ***OGSI*** for assistance.

Operating Instructions

Start-up

Once the system has been installed in accordance with the set-up and installation instructions, it may be energized and cylinder filling may begin. It is highly recommended that the user read the '**Touch Screen Overview**' section (*Pages 35-48*) prior to operating the system.

Ensure that an approved oxygen cylinder is properly connected (*See the manifold operating procedures on pages 49-52*). The system should not be normally operated without a cylinder properly attached and ready to be filled.

On the **MAIN MENU** screen, press the **CONTROLS** button.

Choose between **AUTOMATIC** and **MANUAL** modes of operation. For a detailed explanation of modes and all other touch screen functions, see the '**Touch Screen Overview**' section (*Pages 35-48*). If selected, the **AUTOMATIC** mode will initialize the system when pre-programmed conditions are satisfied and the **ON/OFF** button is in the **ON** position. The **MANUAL** mode requires the user to press an additional **START** button to initialize the system. This is intended to prevent an inadvertent system initialization. With the system running, ensure that the air compressor indicator toggles from red to green. The high pressure oxygen compressor should toggle from red to green after the oxygen compressor is activated and that will occur when the system has produced oxygen of **90%** purity or greater for **4** minutes. The valves can also be monitored from this screen. Each valve should energize for 6 seconds and remain off for 8 seconds. The system should continue to operate until the desired pressure is reached, a fault is encountered or it is de-energized by the user.

Once the machine is running, press the **MAIN MENU** button and then press the **GAUGE** screen button. Both the regulated air and low oxygen pressure gauge needle indicators should be operating within the highlighted green area. The Oxygen Purity Gauge should steadily increase to above **90%**.

The oxygen storage tank pressure gauge should indicate a pressure increase after approximately 15 minutes. If this does not occur, check to make sure that none of the hose connections have come loose. Call ***OGSI Technical Service Department*** at ***(800) 414-6474*** (toll free number in USA and Canada) or ***(716) 564-5165*** if no loose connections are found and trouble persists.

Shut-down

The **CFP-15+/15E+** unit has been programmed to automatically de-energize when cylinder pressure reaches the set point, indicating that cylinder filling is complete. Additionally, it may be manually de-energized by pressing the **ON/OFF** button.

Troubleshooting Guide

Problem	Sign	Cause	Solution
No Power	Blank touch screen display	• **Emergency-Stop** button has been pushed in • Loose wires	• Ensure that power is available from **115 VAC** supply. • Check the **Emergency-Stop** button. If this button is pushed in, it secures all power to the system. • Visually inspect the electrical wiring. Reconnect any loose wires.
System Not Running	No sound	• System is in **MANUAL** mode • Bottle full to set pressure • Active alarm	• Press the additional **START** button if system is in manual mode. • Check the **GAUGE** screen and ensure that the current High Oxygen Pressure is not greater than the set low-point. • Check that bottle valve is open. • Check the **ALARM** screen for any faults. A '**WARNING ACTIVE**' sign will appear at the bottom of each screen if a fault has occurred.
System Shuts Down Inadvertently	'**WARNING ACTIVE**' indication	• Bottle full to set pressure • Active alarm	• Check that bottle valve is open. • Check the **ALARM** screen. If a warning is active, follow the instructions. • Check the high oxygen pressure gauge. If the reading is equal to the set point, the machine has been programmed to shut down.

Valves Sticking	Pressure levels too high	Dusting of sieve or machine filled with dirt and dust due to filters not being replaced	Remove valve block from machine and clean valves and spools completely.
Low Pressure Compressor Not Running	No regulated air pressure	Circuit breaker has tripped	Push in the thermal overload button and restart the machine.

Warning Signs

Thermal Switch Warning	The appropriate thermal overload switch must be reset (by pressing it) and the '**CLEAR WARNING**' button must be pressed. Normal operation can then be resumed.
Low Oxygen Pressure	This may be a result of a leak in the system. Use a leak testing solution to locate and repair any leaks.
The machine has run for 30 minutes and purity has not yet been reached	This may be a result of a leak in the system. Use a leak testing solution to locate and repair any leaks.
Oxygen purity has fallen below acceptable limits	This may be an indication of a leak within the system. Use a leak testing solution to locate and repair any leaks.

Touch Screen Overview

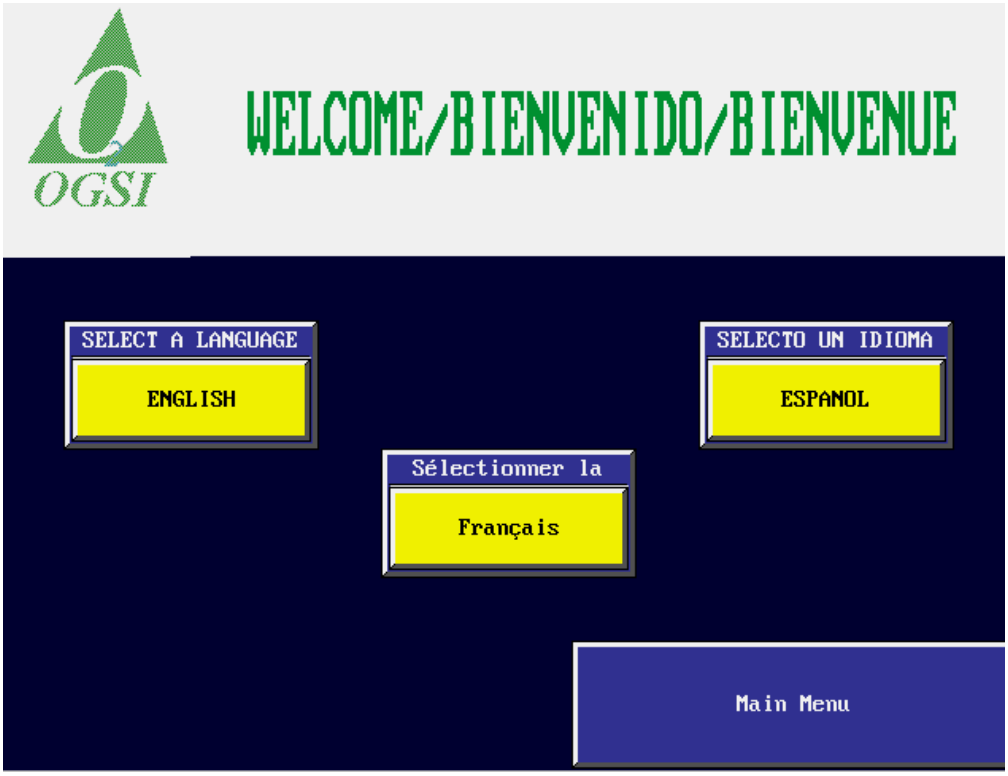
The touch screen is the main interface between the operator and machine, and incorporates all controlling mechanisms within its display.

Listed below are the Main Operator Features incorporated within the touch screen:

- Language selection
- Password protection
- Energize/de-energize the machine
- Monitor the operating condition of valves and compressors
- Monitor all system pressures and oxygen purity
- Set the pressure for cylinder filling at **ON/OFF** set points
- Hours meter and real time clock to monitor service intervals
- Line graphs meter readings showing performance (for up to the previous 24 hours)
- Self-diagnostic alarm panel

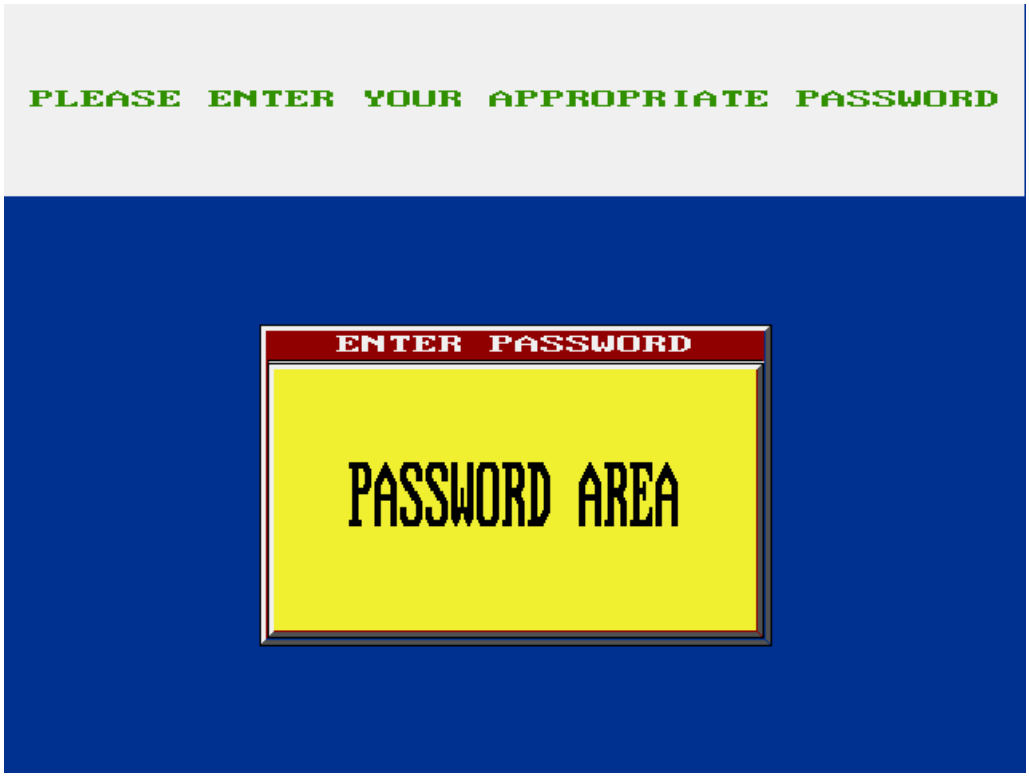
The following pages give a detailed description of the 8 individual screens.

Language Screen



The language screen enables the user to choose the language – English, French or Spanish. After choosing a language, select **MAIN MENU**.

Password Screen



This screen prompts the user to enter the password supplied by the manufacturer.

- Select **PASSWORD AREA**
- Enter the password using the numeric keypad displayed on the screen.
- Select **ENTER**

The password will be verified and the screen will change to the **MAIN MENU** screen when the password is accepted.

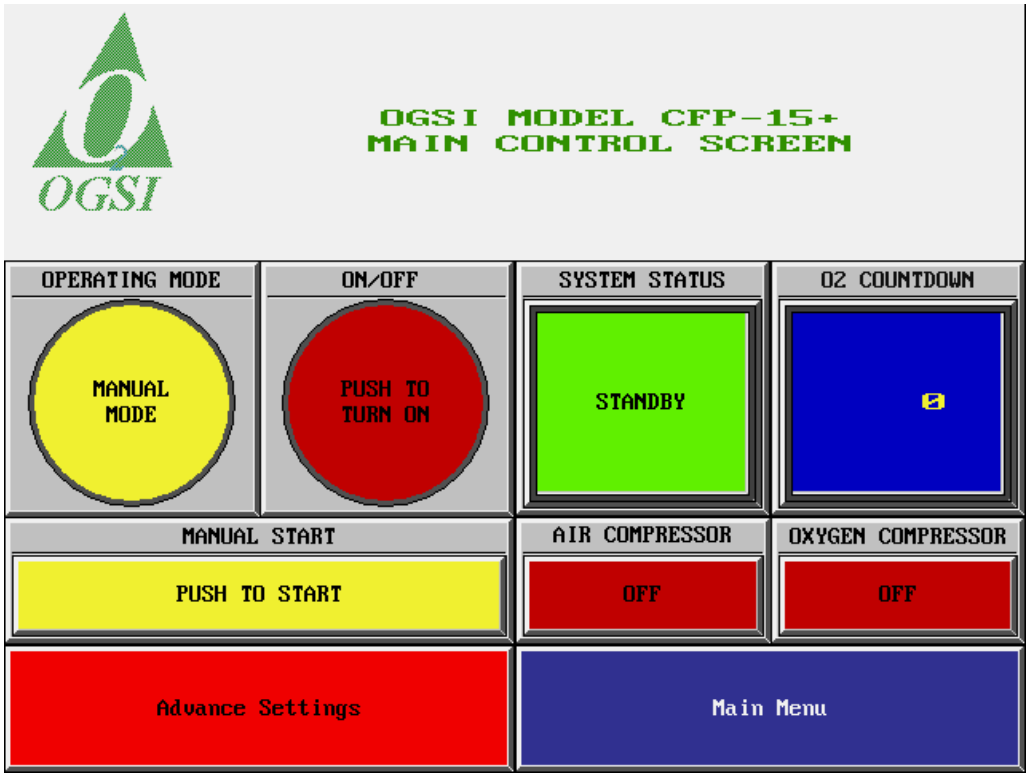
Note: The user will not be allowed to change their default password so please keep it secure.

Main Menu Screen

This screen allows the user to navigate through the program from screen to screen and it will get you where you need to go inside the program.

(**Note**: A notification will appear at the top of the screen only if the machine has the timer set and is turned **ON**.)

Control Screen



- **Operating Mode**

  This feature allows the selection of either **MANUAL** or **AUTOMATIC** modes. The **AUTOMATIC** mode will initiate machine operation when the **ON/OFF** button is in the **ON** position and all other conditions are satisfied. To use the **MANUAL** mode, the user needs to press an additional **START** button. **MANUAL** mode can be used to prevent inadvertent machine operation.

- **Power**

  In **AUTOMATIC** mode, the machine will start operating when the button is in the **ON** position. In **MANUAL** mode, the machine will start only when this button is in the **ON** position and the additional **START** button is pressed. The button will stop the machine in either mode of operation when it is in the **OFF** position.

- **System Status**

  This feature monitors the current status of the system. It will display **STANDBY** when the system is deactivated and **CYCLING** when the system is activated.

- **Manual Start**

  This button is used in conjunction with the **MANUAL** mode of operation, and must be pressed each time the system is restarted.

- **Air Compressor (CFP-15+ Only)**

  This feature monitors the operational condition of the air compressors. When the air compressors are de-energized, it will display **STANDBY** and will toggle to **RUNNING** when they are energized.

- **Feed Air Valve (CFP-15E+ Only)**

  This feature monitors the status of the valve controlling the flow of the feed air. It displays **CLOSED** when the valve is turned off allowing no air to flow to the machine.

- **Oxygen Compressor**

  This feature monitors the operational condition of the oxygen compressor. When the oxygen compressor is de-energized, the feature will display **STANDBY**. When the oxygen compressor is energized, it displays **RUNNING**.

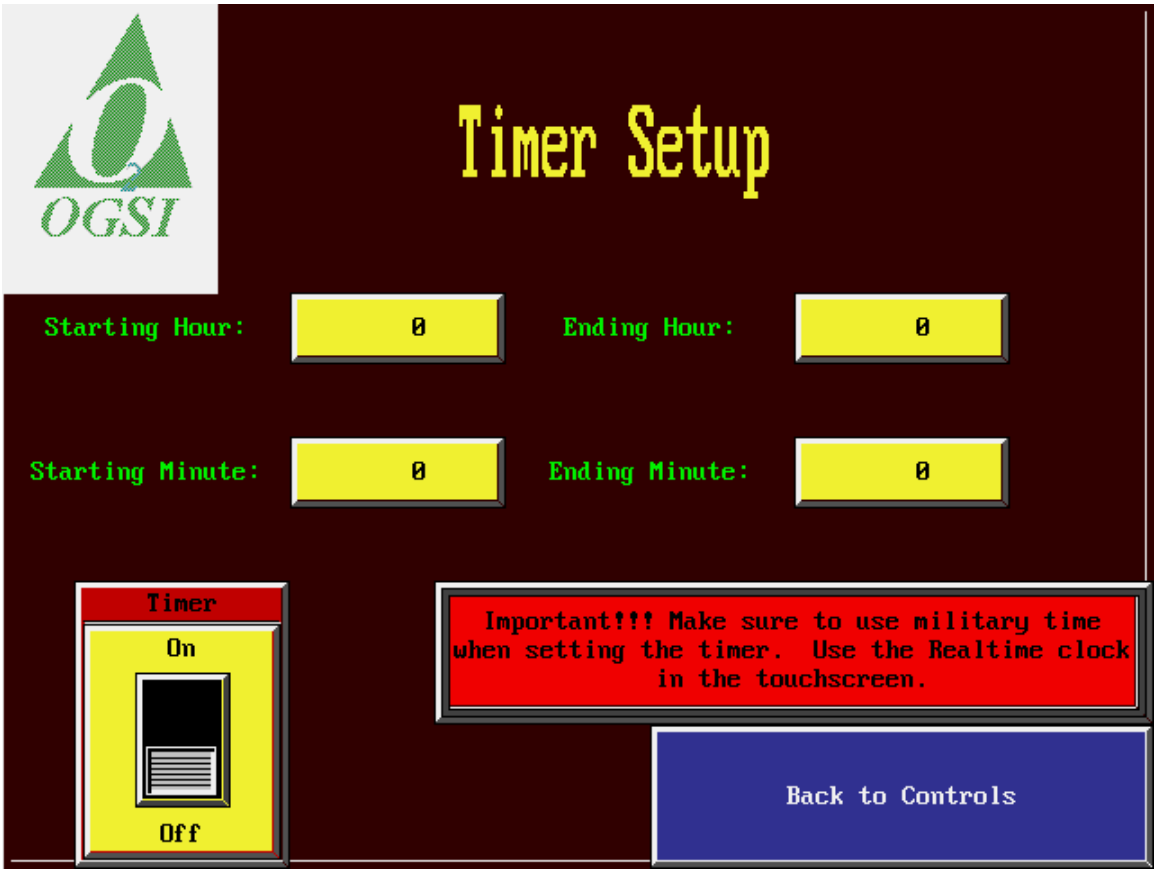
- **Oxygen Countdown**

  This indicator monitors and lets the user know when the oxygen compressor will be turning **ON/OFF**. This indicator resets frequently due to the duty cycle of the oxygen compressor.

- **Advance Settings**

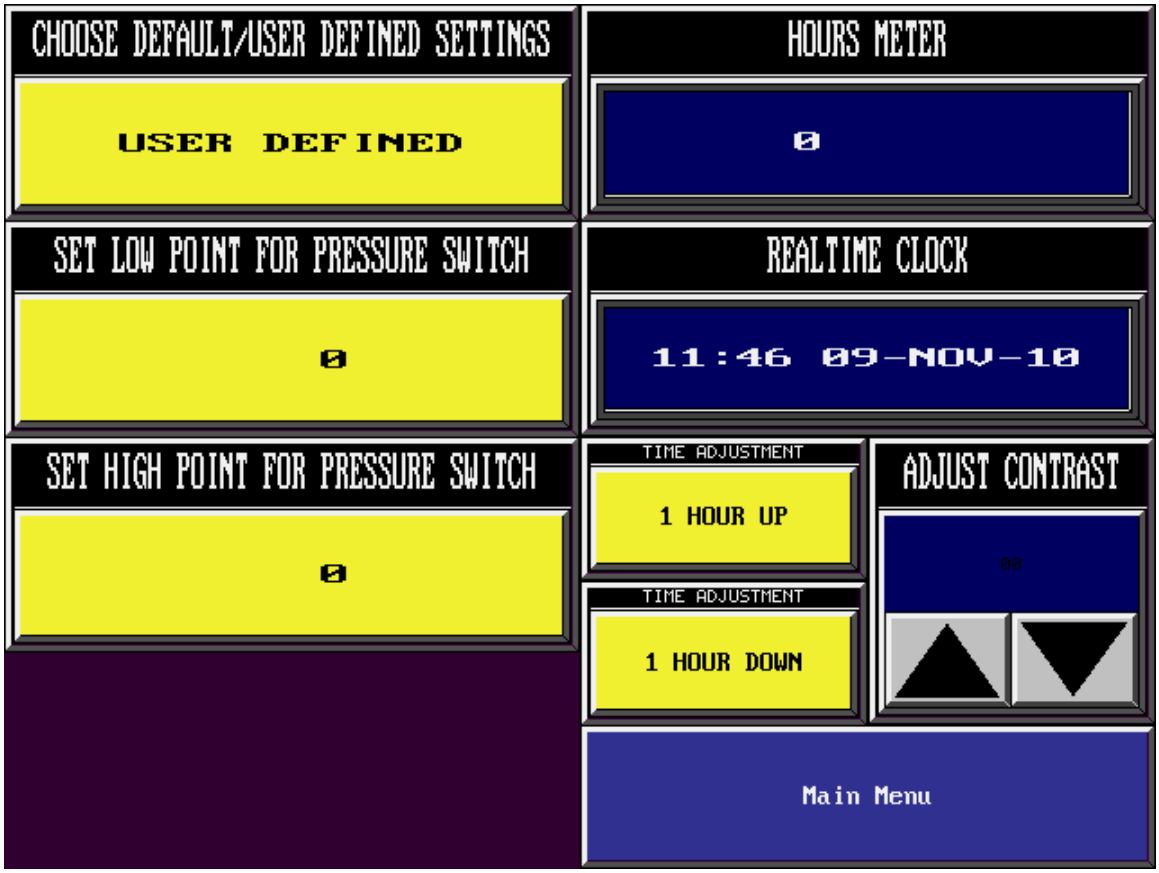
  This button allows the user to move the timer screen which lets the user set the machine to turn **ON/OFF** at specific times.

Advanced Settings



This feature allows the user to modify timer settings. If there are particular hours of the day you want the machine to run, you can enter the hour and minutes (military time) you want into the starting and ending time inputs.

Settings Screen



- **<u>Choose Default/User-defined Settings</u>**

  This password protected feature allows the user to operate the machine using either the manufacturer's settings or customized settings. The manufacturer's settings are set at **1950 psi (135 bar)** and **2200 psi (152 bar)**. When the high point of this setting is reached, the machine will de-energize and the cylinder filling will cease.

  To customize the settings, enter the low and high pressures using the displayed numeric keypads. When the cylinder pressure drops to the low point, the machine re-energizes and cylinders can be filled once again to the high point.

- **<u>Set Low Point for Pressure Switch</u>**

  This is a password protected feature that allows the user to customize the low-pressure setting. Valid entries are between **0-2050 psi (0-141 bar)**. A warning will be displayed if the low-pressure entry is higher than the high-pressure entry and the system will not operate.

- **Set High Point for Pressure Switch**

  This is a password protected feature that allows the user to customize the high- pressure setting. Valid entries are between **0-2200 psi (0-152 bar)**. A warning will be displayed if the high-pressure entry is lower than the low-pressure entry and the system will not operate.

- **Hours Meter**

  This meter displays the accumulated operating time of the system. This meter will increment only while the system status is **CYCLING** and will reset to zero after 10,000 hours. Most maintenance will be related to the number of hours the machine has been operating.

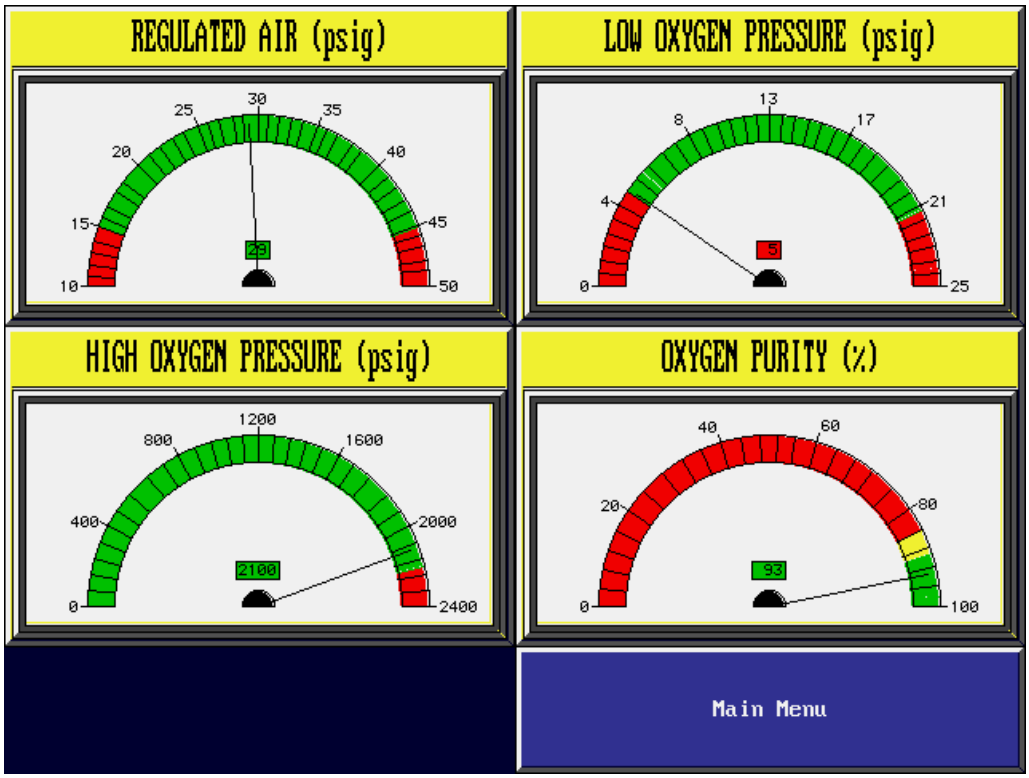
- **Real-time Clock**

  This is a password-protected feature that allows the user to synchronize the system's clock according to the current time-zone.

- **Adjust Contrast**

  This button allows the user to adjust the screen brightness according to his/her eyes' sensitivity.

Gauge Screen



- **<u>Regulated Air</u>**

  This feature displays the pressure associated with the air compressor (**CFP-15+**) or feed air (**CFP-15E+**). This pressure is typically between **15 psi (1 bar)** and **35 psi (2.4 bar)**.

- **<u>Low Oxygen Pressure</u>**

  This feature displays the oxygen pressure prior to entering the high-pressure oxygen compressor. This pressure is typically around **5 psi (0.3 bar)**.

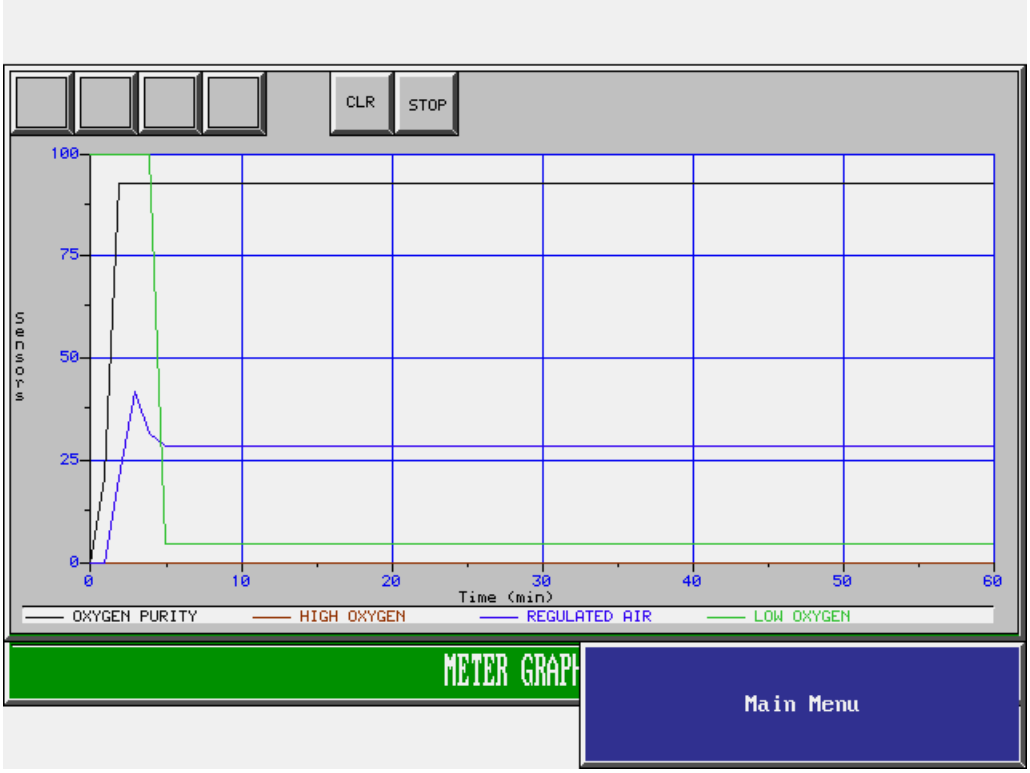
- **<u>High Oxygen Pressure</u>**

  This feature displays the oxygen pressure exiting the high-pressure oxygen compressor (entering the cylinders). This pressure is typically between **0 psi** and **2200 psi (152 bar)**.

- **<u>Oxygen Purity</u>**

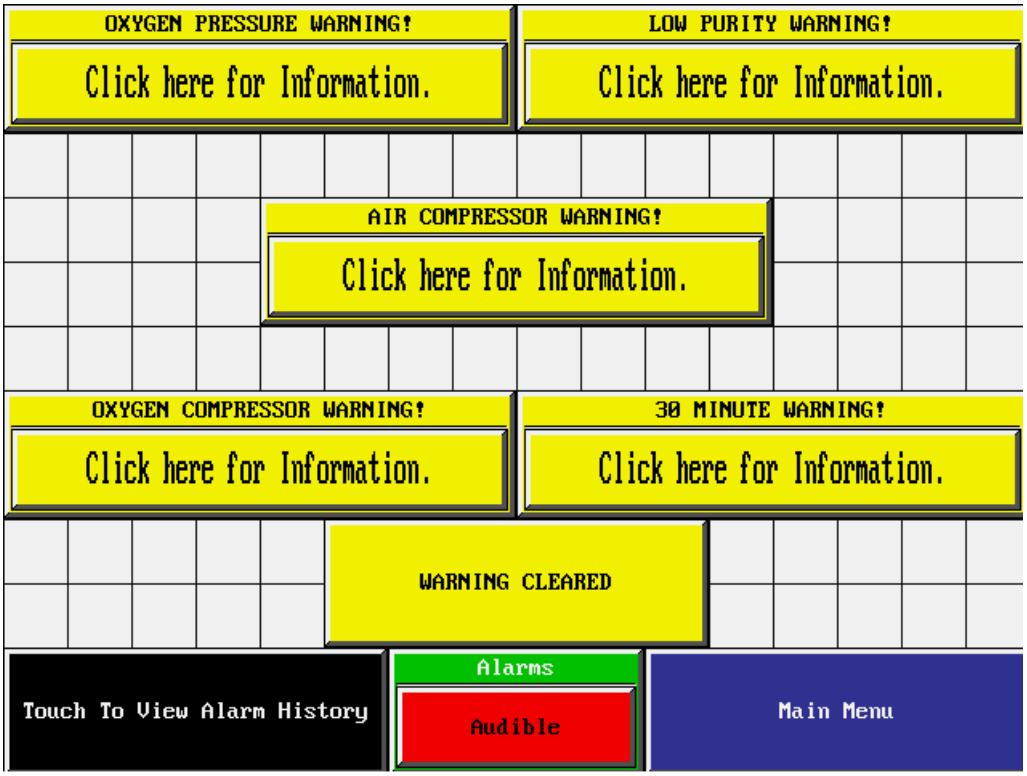
  This feature displays the percentage of oxygen present which is typically **93% (±3%)**.

Pressure-Line Graph Screen



This screen shows the graph based on the readings on the **GAUGE** screen. Note that the high-pressure oxygen display has been scaled down by a factor of 100. **60** minutes are displayed at a time and 24 hours of chart readings are stored in memory. If power to the machine is lost (**Emergency-Stop** button is pushed in, machine is unplugged, etc.), the chart memory will be lost.

Alarm Screen



This feature displays warnings when any of the following faults occur:

- Oxygen pressure has fallen below acceptable limits. (This fault does not de-energize the machine.)
- Oxygen purity has fallen below acceptable limits.
- Oxygen compressor pressure switch has tripped.
- Air compressor thermal switch has tripped.
- Oxygen compressor thermal switch has tripped.
- Air compressor has been running one hour, and the purity has not yet reached an acceptable level.

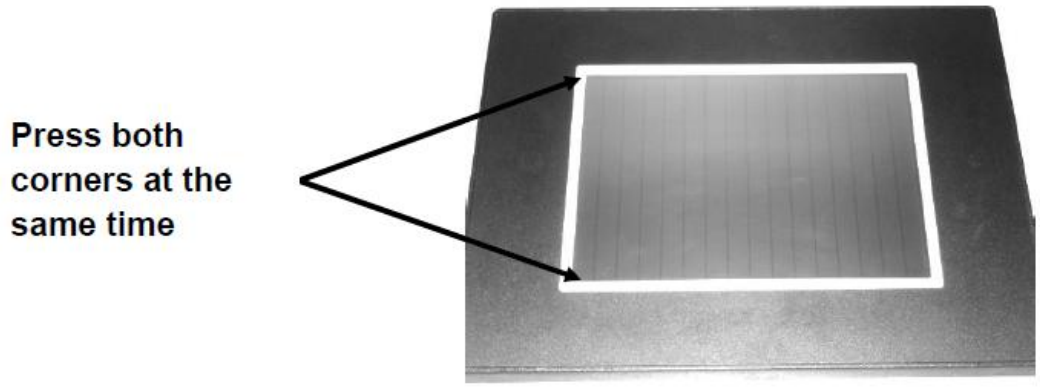
Instructions will be displayed on the screen to clear any warnings. For certain alarms, the machine will not operate until the '**CLEAR WARNING**' button has been pressed.

Final Screen

This screen displays information pertinent to the system, and manufacturer contact information. The Model Number of the Machine and its Serial Number are displayed along with the Date of Completion. The software versions for both the Programmable Controller and Touch Screen are also shown. During the course of normal maintenance, the company may offer to upgrade the software packages on the machine as improvements and modifications to it become available.

Correcting Missing or Irregular Touch Screen Color Scheme

- Ensure that the machine is not in **CYCLING** mode and leave the power button in the **ON** position.
- Touch both the top left corner and the bottom left corner of the touch screen at the same time.



- Select the appropriate language – English or Spanish.
- Select **CONTRAST** and use the up and down arrows to change the contrast settings to get the clearest picture. Select **EXIT** when done to return to the main menu.
- Select **DISPLAY TEST**. The screen will display all the colors continuously, allowing the user to see if a color is not displayed correctly. Select **EXIT** at any time to go back to the previous screen.
- Select **TOUCHPAD TEST**. The screen will display a grid. The user can select each square in the grid to ensure that all sections of the screen are responding. Select **EXIT** to return to the main menu.
- Select **EXIT** when done to return to the screen displayed before the two corners were pressed.

Manifold Design & Installation

Design

The **CFP-15+/15E+** cylinder filling manifold serves two purposes:

- To connect the **CFP-15+/15E+** to each bottle for filling
- To connect the bottles to one another for equalizing during trans-filling (filling smaller bottles from larger ones)

A shutoff valve is located at the end of the manifold, downstream of the K-type storage cylinders. This valve stops the flow of oxygen when a small cylinder is not attached in the filling station and also allows the user to fill the storage cylinders. Every oxygen cylinder is equipped with its own shutoff valve, so any additional valves in the system are unnecessary. It is recommended that the filling manifold be as simple as possible with few valves and fittings in order to keep the number of potential leak points to a minimum.

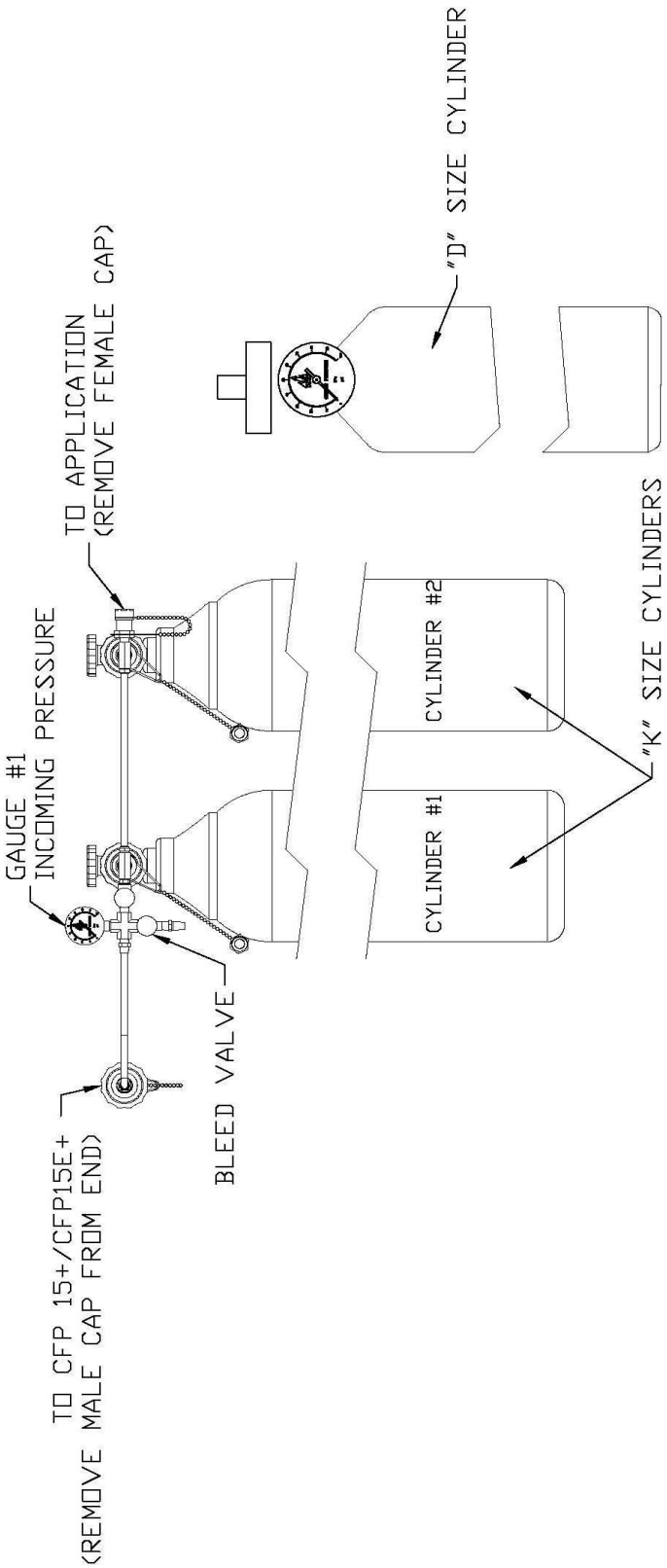
Preferred materials for use in high pressure oxygen generation include, but are not limited to:

- Stainless Steel
- Brass
- Bronze

Installation

When building and installing a cylinder filling manifold, it is necessary to ensure that the threads on all NPT connections and all stainless steel on stainless steel connections are lubricated by Teflon tape or a similar pipe dope (such as Krytox grease). It is equally important to ensure that the threads on all compression fittings, such as the *CGA 540* connections on K-type cylinders, are clean unless the threads are stainless steel on stainless steel. All fittings should be tightened with a wrench (much tighter than hand tight). Once the manifold is built and installed, it needs to be checked for leaks with oxygen at **2200 psi (152 bar)**. This can be done by shutting the valves on all bottles and using the **CFP-15+/15E+** to fill the manifold to **2200 psi (152 bar)**. Each joint should then be checked for leaks by applying soapy water to the joint using a spray bottle or a small paintbrush. If bubbles are formed, it means that there is a leak. If a leak is found, the joint should be tightened further with a wrench. If this does not work, the joint should be disassembled and cleaned, then reassembled and tested. If this does not work, the leaking fittings need to be replaced.

Manifold Drawing



Manifold Operating Procedures

Warning:

High pressure oxygen may present a hazard. Always follow proper operating procedures, and open valves slowly. Rapid pressurization may result in personal injury. Safety glasses and hearing protection are required when venting oxygen under high pressure. The intended use of the **CFP-15+/15E+** is to fill large K-type cylinders. The smaller M-type cylinder can then be trans-filled from the K-type cylinder.

Attaching and filling a K-type cylinder:

With all valves initially closed, connect the steel whip between a manifold valve and a cylinder valve and tighten both connections using **$1^1/_8$"** wrench. Slowly open the cylinder valve first and then the manifold valve. Fully open both valves, backing off **¼"** turn to prevent the valve from sticking in the open position and appearing closed. At this point, the gauge on the top of the manifold will read the pressure contained within the cylinder. Now, cylinder filling can be initiated by starting the machine, *(See Start-up Procedures on Page 32).*

Detaching a K-type cylinder:

With the machine turned off, close each of the appropriate manifold and cylinder valves.

Warning: Oxygen under high-pressure is present. The use of safety glasses and hearing protection is required.

Slowly disconnect the steel whip from the cylinder valve, using **$1^1/_8$"** wrench.
Be aware of the venting of oxygen under high pressure. If difficulty is encountered while attempting to remove the steel whip, open the appropriate manifold valve and then slowly open the bleed valve to vent the pressure. This will allow easier removal of the steel whip. Ensure that both manifold and bleed valves are closed after venting pressure.

Attaching and filling an M-type cylinder:

It is intended that M-type cylinders be filled from K-type cylinders. With all valves closed, attach the steel whip between the M and K type valves (see '**Attaching and filling a K-type cylinder'** above). Slowly open the K-type cylinder valve, followed by the M-type cylinder valve. Allow pressure to vent from the K-type into the M-type. When the desired pressure is reached in the M-type cylinder, close both valves.

Warning: Oxygen under high-pressure is present. The use of safety glasses and hearing protection is required. Disconnect the steel whip following the procedure outlined in '**Detaching a K-type cylinder'** above.

Preventive Maintenance

Air Filter Element Replacement:

The air filter element provided with the **CFP-15+** must be replaced every **six (6)** months on an average. This element helps to maintain the quality of the feed air supply and preserve the molecular sieve inside the oxygen generators. For the **CFP-15E+** unit, the filters used on your own air compressor must be replaced as often as necessary to maintain proper feed air quality. *(Contact the manufacturer of your compressor for recommended service intervals)*

Failure to replace the filter element on schedule will result in the warranty becoming invalid.

Oxygen Sensor:

The oxygen sensor should be calibrated on a monthly basis. Contact ***OGSI*** or see **Service Manual** for proper procedure.

Cabinet & Power Cord:

The cabinet and power cord should be occasionally washed down with a sponge or clean rag and some soapy water. Avoid the use of ammonia or other strong chemical based cleaning solvents. This prevents dust and dirt from building up on the machine.

Air Compressor (CFP-15+ Only):

The air compressor should last **five (5) or six (6) years** or longer under normal operating conditions. Eventually, however, it will need to be re-built or replaced. Oxygen purity and flow rate along with feed air pressure delivered to the sieve beds will all be indicators that the air compressor has expended its life. Replacement in the field is possible, but returning the unit to ***OGSI*** or an authorized service center is recommended.

Valve Replacements:

The best method to address this issue is to return the unit to ***OGSI*** or to an authorized service center for repair, the same procedure as compressor repairs.

Technical Service Assistance

It is our intention to provide complete customer satisfaction. This manual is one way in which we hope to provide you with technical assistance.

If you do not find what you need in this manual or you have other questions about this equipment, please feel free to contact us directly. We look forward to serving your oxygen needs and invite your inquiries. We will respond to you as promptly as possible.

You can reach ***OGSI*** through the following means:

- **By Telephone (Within the United States and Canada)**:

  (800) 414-6474 - Our toll free number (Within USA and Canada only)
  (716) 564-5165- Our direct number

- **By Telephone (Outside the United States)**:

  Your local International Access Code (usually **0** or **00**), followed by
  The Country Code for the U.S. which is (**1**), followed by
  Our Area Code and Number (**716**) **564-5165**

- **By Automated Voicemail:**

  (716) 564-5165

- **By Fax (Within or outside the United States)**:

  (716) 564-5173

- **By E-Mail or Website:**

  ogsimail@ogsi.com
  http://www.ogsi.com

- **By Mail**:

  OGSI
  814 Wurlitzer Drive
  North Tonawanda, New York 14120 USA

- **By UPS, FedEx or Common Carrier:** *(Address to return shipments)*

  OGSI
  814 Wurlitzer Drive
  North Tonawanda, New York 14120 USA

*Technical service personnel are available from **8:00 AM** to **5:00 PM** **EST** (GMT - 5).*
We also have a list of Distributors and Authorized Service Agents available upon request.

Customer Satisfaction Survey

Help us serve you better. Please take our Customer Satisfaction Survey at www.ogsi.com

Appendix

Spare Parts List

	PART NUMBER	QUANTITY
1/8" 2-Way Solenoid Valve ASCO	1510009.B01	1
#25 Orifice	1610002.B25	1
1/8" Sintered Bronze Muffler	1700002.B01	1
3/8" Exhaust Muffler	1700002.D02	1
1/4" Regulator 0-25 psi	2150002.025	1
OEM 110VAC Valve Block Assembly	7020003.002	1
Purge Loop T Assembly	7040002.002	1
OEM Receiver Tank Assembly	7050002.001	1
Enhanced Sieve Bed Assembly 2/set	7060001.002	1
Rubber Stud Bumpers	1460001.001	4
1/4" Solenoid Valve Rebuild Kit 2200 psi	1517001.C01	1
1/4" Direct Acting Solenoid Valve 2200 psi	1510009.CD2	1
#10 Orifice	1610001.B10	1
1/4" Sintered Bronze Muffler	1700002.C02	1
Level 1 Seal/O-ring kit	21260MB.SD1	1
HEPA INLINE FILTER	2160001.C04	1
7 MICRON FILTER ELEMENT	2180001.001	1
Plate Mount Diamond (Rubber Feet)	1460001.002	4
1/4" Safety Valve 55 psi	1540001.C01	1
Heat Exchanger	2140020.001	1
PHD-02 Micron Inlet Filter	2160001.C01	1
1/4" Black Intake Filter	2160001.C02	1
1/8" 2-way Solenoid Valve ASCO	1510009.B01	1
#10 Orifice	1610001.B10	1
DL-05-AR PLC	1810002.001	1
F0-04AD-1 4 Channel Input Card	1810103.002	1
25A Motor Contactor	1810107.002	1
DIN Rail Mounted 15A Circuit Breaker	1830003.D15	1
Low Pass Filter for 25A Motor Contactor	1860100.002	1
24VDC Power Supply	1860200.001	1
0-50 PSI Pressure Transducer	1910001.050	1
Internal Oxygen Sensor	3110003.008	1
Touch Screen Panel	1810001.S8C	1
Potter & Brumfield Power Reset Breaker	1830002.001	1
Emergency Stop Button	1840052.001	1
12/3 Power Cord 14'	1890001.123	1
0-3000 psi Pressure Transducer	1910003.000	1
Fan 120V 115 CFM/49 dBA	2140001.001	1
Wire Fan Guard	2140002.001	1
3/8" OD x 1/4" ID Parflex - Clear	2210003.DP4	1
1/4" OD x 1/8" ID PVC - Green	2210004.C01	1
1/2" Poly Tubing - White	2210003.D02	1
1/2" PTC x 1/4" NPT 90 Elbow w/Swivel	1210004.E4C	1
1/2" PTC Union Elbow	1210004.E3E	1
1/2" PTC x 1/4" NPT Adapter	1300004.E1C	1
Nylon High Pressure Hose w/1/4" JIC Swivel	224166B.030	1
Manual – Available Free on Website	9000000.002	1

Oxygen Cleaning Procedure

Scope

This procedure sets forth the cleaning requirements for parts that are used in the construction of ***OGSI*** oxygen systems and are in the gaseous oxygen product stream, including but not limited to valves, tubing, fittings, manifolds and pipes. This procedure represents the method for cleaning OGSI oxygen service equipment. These cleaning methods and subsequent inspections result in a degree of cleanliness required for the safe operation of the oxygen service equipment.

This document is based on guidelines provided in the Compressed Gas Association (CGA) publication ***CGA G-4.1-2009,*** and is intended to comply with that publication.

Supersession

This procedure supersedes all previous written and verbal direction set forth with Audubon Machinery Corp and its operating subsidiaries on the topic of cleaning and preparing parts for oxygen service.

The Chief Engineer, or his/her delegate, shall periodically review this document as well as other industry relevant procedures and publications to ensure consistency between AMC internal procedure and industry norms.

Safety

Contamination such as grease, dirt, oil, dust, solvents, weld slag, sand, rust, paper, fiber, rags, wood, coal, and previously applied thread sealants on parts that come into contact with oxygen can cause a combustion reaction resulting in system degradation, failure, or a hazard to nearby personnel. Care needs to be taken in the cleaning and handling of components used in oxygen service to prevent any contamination related failure.

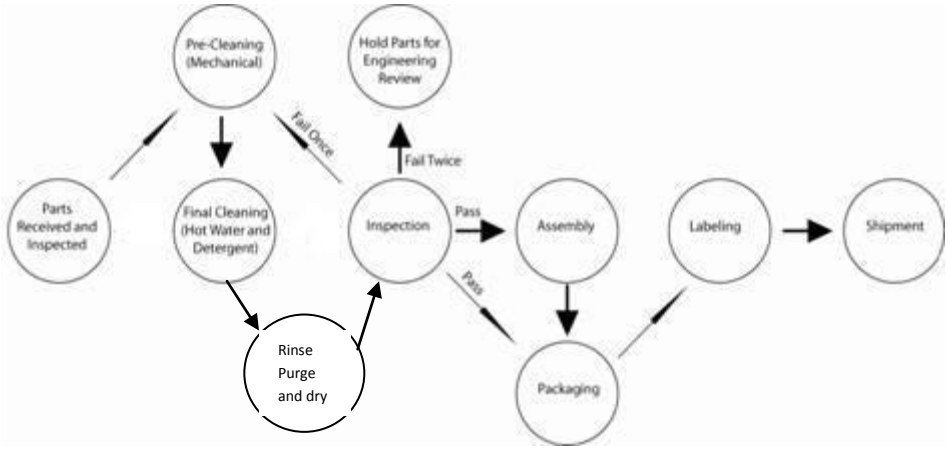
While the ***CGA G-4.1-2009*** standard makes allowance for cleaning parts using caustic agents, acids or solvents, the ***OGSI*** procedure will use only mechanical (soaking, wire brushing or grinding) means for pre-cleaning and hot water cleaning with aqueous detergents for final cleaning. An effective rinse with potable water is mandatory and applied to ensure that the residual cleaning agent is removed from the system.

Training

Personnel involved in the cleaning, preparation, and assembly of parts used in oxygen service will be trained in these cleaning procedures and be familiar with this document. Documented evidence of training (with annual refresher training) shall be maintained by the supervisor of each impacted employee.

Process Flow Chart

The flow chart below describes oxygen cleaning and parts handling process.



Parts Received and Initial Inspection

Upon determining which parts need to be cleaned, the technician needs to perform an initial visual inspection (under white light). Check for the presence of visible residue on the parts including but not limited to oil, grease, dirt, dust, rust, weld slag or pre-existing thread sealant among others. For parts that have an internal cavity that is not directly observable by the naked eye, a lint free cloth that is first soaked in water can be inserted into the part and withdrawn for evidence of contamination. No part failing inspection shall be used in any assembly.

Pre-Cleaning

Pre-cleaning methods include soaking parts in a water based solution with an aqueous detergent, using a wire brush or thread pick, holding it under a wire brush grinding wheel or simply wiping it down with a clean rag. Upon completion of pre-cleaning, the part should be clear of any visible contamination and ready for final cleaning.

Final Cleaning

Final cleaning involves placing the parts into either (1) the parts washing machine, adding an appropriate amount of detergent and running them through the cleaning cycle, or (2) placing the parts into the aqueous ultrasonic cleaning machine, selecting the designated temperature and cycle time, or (3) performing a 15 minute flush of aqueous detergent solution through a hose or cavity, and then rinsing the part(s) in a potable water rinse once complete. Consideration shall be given to the size, shape and number of parts to be cleaned at one time to ensure that the system is not overloaded or its function impaired. The cleaning temperature inside the washers shall be **120°F (49°C)** to **140°F (60°C)** and the detergent to be used shall be Cascade™. Parts can be removed from the washer once the drying cycle is complete.

Inspection

Upon completion of the final rinse cycle, all parts should be removed from the parts washing machine and visually inspected with both a bright white light and an ultraviolet ("black") light for any residual contamination. The item shall be observed to confirm the absence of any contaminants including any oil, grease, detergent, moisture, lint, or other foreign materials. If any material remains on the part after the final cleaning cycle, the part shall be returned for a second round of pre-cleaning, final cleaning, and rinse.

If a part is processed through this cycle twice and continues to exhibit signs of contamination, the part shall be noted as non-conforming and processed per the company Control of Non-Conforming Material (QP-03).

Assembly, Handling, and Packaging

Once a part or assembly has been cleaned for oxygen service, it should be either immediately assembled into the final assembly, or protected to prevent recontamination if it will be put into storage.

Personnel handling O2 cleaned parts shall wear powder free Nitrile examination gloves. When practical, internal cavities of assemblies and machines in process shall be capped, closed or otherwise protected to prevent the introduction of contamination during the assembly process.

If immediate use is not intended or is impractical, the O2 cleaned part will be packed in a manner to prevent recontamination. Small to medium sized parts will be packaged in sealed plastic bags. Larger assemblies will be bubble-wrapped or wrapped in foam material, openings protected with caps and/or plugs, and then moved to final packaging in boxes and/or crates.

When servicing O2 parts outside of the factory, field technicians must take care to handle parts with nitrile gloves, and to thoroughly flush and degrease the parts prior to use. Whenever practical, the parts should be cleaned and packaged following this process prior to departure from the factory. A mechanical brush cleaning, followed by a flush with copious amounts of isopropyl alcohol may be substituted for simple parts with no hidden cavities. A visual inspection using a bright white and ultraviolet ("black") must be performed. Removal/purging of any residual IPA can be considered complete when the solvent cannot be detected by appropriate methods

Labeling

Once a part or an assembly has been cleaned and packaged for oxygen service, it should be labeled per the customer's instructions, but at a minimum;

- contain the statement "**Cleaned for Oxygen Service per EP002 Do Not Open Until Ready to Use**"
- Part Number
- Date of cleaning or packaging
- Date of Inspection with inspector's mark

References

The following publications were referenced in the creation of this document.

- CGA G-4.1-2009, ***Cleaning Equipment for Oxygen Service***, Compressed Gas Association, Inc., 4221 Walney Road, 5th Floor, Chantilly, VA 20151. www.cganet.com
- ***Oxygen Cleaning Procedure*** Rev. L (8/05), RIX Industries, Inc., 4900 Industrial Way, Benicia, CA 94510. www.rixindustries.com
- ASTM MNL36-2, ***Safe Use of Oxygen and Oxygen Systems: Handbook or Design, Operation, and Maintenance,*** ASTM International, West Conshohocken, PA ©2007

Oxygen Sensor Calibration Procedure

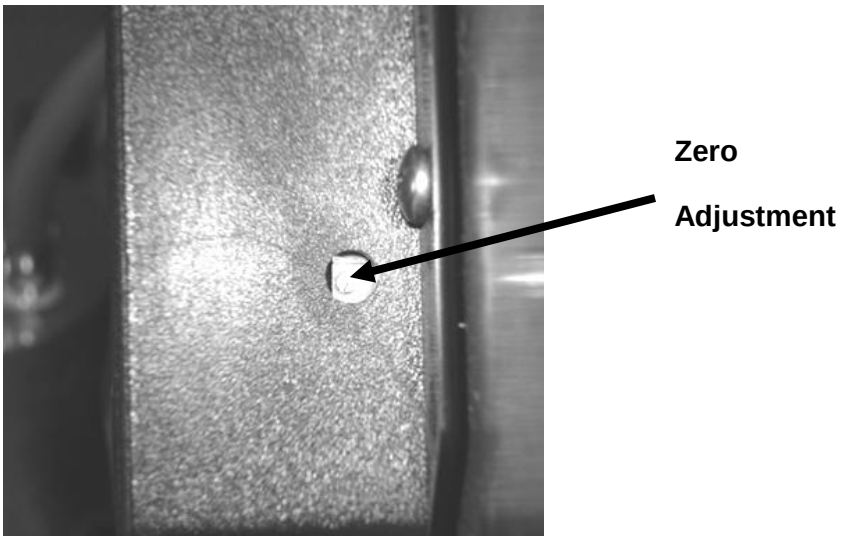
Oxyalert 2-Gas Sensor ±1% accuracy

15 LPM Maximum flow

Manufacturer: Douglas Scientific (Compass Controls)

Contact: *Don Stinnett*

Phone: *(913) 438-5988*



Notes:

The Zero potentiometer is used calibrate the sensor to zero with pure nitrogen.

The Span potentiometer is used to calibrate the sensor to a known purity of oxygen.

It may be necessary to temporarily remove the oxygen sensor from the electrical module to gain access to the calibration potentiometers.

100% oxygen will give a 90% reading due to the lack of 5% argon in the gas.

It is recommended that calibration be performed with a gas 93% pure, as this is the normal output purity of the **CFP-15+.**

Procedure:

Apply a known purity of oxygen to the sensor and verify the sensor reading matches the purity of the oxygen used.

Air Changes by Room Size/Machine Size

Air Changes Required in a Room Per Hour for All Models											
Model Number	**Room Volume in Cubic Feet (ft^3)**										
	1000	**2000**	**3000**	**4000**	**5000**	**6000**	**7000**	**8000**	**9000**	**10000**	**12500**
OG-15	5	2.5	2	1.5	1	1	1	1	1	1	1
OG-20	8	4	2.5	2	2	1.5	1	1	1	1	1
OGS-20	8	4	2.5	2	2	1.5	1	1	1	1	1
OG-25	10	5	4	2.5	2.5	2	1.5	1	1	1	1
OG-50	20	10	7.5	5	5	4	3	2.5	2	2	1.5
OG-100	NR	20	15	10	9	8	7	5	4	4	3
OG-175	NR	25	18	12.5	11	10	8	6	5	5	4
OG-250	NR	30	22.5	15	13	11	9	7.5	7	6	5
OG-375	NR	NR	30	27	22.5	18	15	13	11	8	7
OG-500	NR	NR	NR	30	27	22.5	18	15	13	11	8
OG-650	NR	NR	NR	NR	30	27	22.5	18	15	13	11
OG-750	NR	NR	NR	NR	NR	30	27	22.5	18	16	13
OG-1000	NR	NR	NR	NR	NR	NR	NR	30	26	22	17
OG-1250	NR	NR	NR	NR	NR	NR	NR	NR	NR	30	24
OG-1500	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	30
CFP-15+/15M	5	2.5	2	1.5	1	1	1	1	1	1	1
MOGS-100	NR	20	15	10	9	8	7	5	4	4	3

Notes:

1. **NR** *means that the models indicated are not recommended for rooms of this size.*
2. *For air changes requirements for models* ***OG-2000*** *and above, please contact* ***OGSI****.*

Units of Measurement

lb	U.S. Pound
hp	Horsepower
psi	Pound-force per Square Inch
kW	Kilowatt
kWh	Kilowatt hour
ft^3	Cubic Feet
VAC	Volts Alternating Current
Hz	Hertz
SCFH	Standard Cubic Foot per Hour
SCFM	Standard Cubic Foot per Minute
LPM	Liter Per Minute
1 bar	1.45×10^1 psi
dBA	Decibel (A scale)
A	Ampere
W	Watt
°C	Degree Celsius/Centigrade
°F	Degree Fahrenheit

Maintenance Log

Date	Part	Reason for Maintenance	Authorized Service Technician Signature